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Common Murres With and Without White Eye-rings

See page 102

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CONTENTS

NOTES ON BANDING OPERATIONS ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE IN 1929. By *Harrison F. Lewis*. 1 Figure. 95

THE BANDING OF CHIMNEY SWIFTS AT CHATTANOOGA, TENNESSEE. By *Wyman R. Green*. 5 Figures and 1 Map 104

BEHAVIOUR AND LOCAL DISTRIBUTION OF TUFTED TITMICE IN WINTER AND SPRING. By *Mabel Gillespie*. 1 Figure and Map. 113

A LIST OF THE ACTIVE BANDING STATIONS IN THE TERRITORY OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION. By *Charles B. Floyd*. 1 Map. 127

SOME PURPLE FINCH NOTES, PRINCIPALLY ON THE MOULT OF THE PRIMARIES AND SECONDARIES. By *M. J. Magee*. 136

GENERAL NOTES.—Spring Arrivals of Song Sparrows in 1930, 140; Complete Record of a Wintering Lincoln's Sparrow, 140; A Sparrow Hawk Recovery, 141; Two White-throated Sparrow Recoveries, 141; House Wren Returns, 141; Interesting History of two White-breasted Nuthatches, 142; A Mourning Dove Recovery, 142; Wood Thrush Returns-S, 142; A Five-Year-Old Downy Woodpecker, 142; A Migrating White-throated Sparrow Return, 143; Tree Sparrow Returns-W During the Season of 1929-30, 143; A Northern Shrike Repeat, 143; A Change in Nesting Habits of the Wood Pewee, 144; Slate-colored Junco Recovery, 144; A Song Sparrow Return-3 S, 144; An Unusual Duck Hawk Recovery, 144; Evening Grosbeak, Robin and Purple Finch Recoveries, 145; A Common Tern Recovery, 145; Ten Thousand Purple Finches Banded at one Station, 145; Known History of Four Chipping Sparrow Nestlings, 145; SUGGESTIONS FOR COLLECTING EXTERNAL PARASITES OF BIRDS, 146; NOTICE TO COLLECTORS OF BIRD PARASITES, 146.

RECENT LITERATURE.—The Book of Bird Life, 147; Der Vogelzug, 147.

CORRESPONDENCE.—A Note on a Proposed Addition to Banding Terminology, 148.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. I JULY, 1930 No. 3

NOTES ON BANDING OPERATIONS ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE IN 1929

By HARRISON F. LEWIS

IT was on the morning of July 31, 1929, that we dropped anchor in the little harbor at St. Mary Islands Bird Sanctuary on the north shore of the Gulf of St. Lawrence, prepared to begin our bird-banding activities for the season. We were late. We had more than a thousand bands to place and had intended to commence banding about ten days earlier, but, as often happens in that region, had suffered various delays. By the end of July many young Gulls could fly and many Razor-billed Auks and Common Murres had young so large that they would very soon be abandoning their breeding-places and taking to the water. In order to place all our bands it was necessary to act promptly, so, after a hurried breakfast, we went ashore, assembled a staff, and began the circuit of the Middle St. Mary Island, searching the holes and cracks in the rocks for our prey.

Throughout the banding operations of 1929 I was ably assisted by George Jones, while E. C. Abbe and Hiram and Charles Osborne rendered yeoman service whenever possible. As a result of the joint efforts of so many workers we succeeded in placing 601 bands in the first four days at St. Mary Islands, while, after some interruptions, our bird-banding for the season ended on August 18th, when the last of our supply of 1046 bands was put on the tarsus of a young Razor-billed Auk. This does not indicate a high rate of speed as compared with that attained in some of the large Tern colonies farther south, but nevertheless it really represents a great deal of scrambling about over rough rocks and compares very favorably with similar work in this same region in previous years. Large, concentrated colonies of Ring-billed Gulls or Double-crested Cormorants, when the young are at just the right age, provide

fairly rapid banding, but most of the rest of our banding work requires the expenditure of a good deal of energy per bird banded, and anything higher than 100 a day is reckoned a creditable score. The highest number of bands that we placed in one day last summer was 187, on August 3d.

The banding at St. Mary Islands, as at many other points along the north shore of the Gulf of St. Lawrence, is of a "mixed" type. That is, several species, such as Puffins, Razor-billed Auks, Common Murres, Black Guillemots, Herring Gulls, and Great Black-backed Gulls, occur on the same island, generally more or less intermingled, and as the banding crew works over the breeding-areas none of these birds of suitable age that may be obtainable are refused, so that continuous operations on any one species are rare.

Most of the Alcidæ breeding here have their eggs or their young in some protected place, such as a crack or crevice in the granitic bed rock, or a position under or among boulders, or (in the case of the Puffin) a nest at the end of a burrow in the soil, so that in the majority of cases they cannot be reached, but, on the other hand, in many cases the old birds may be surprised and cornered in their retreats, and both old and young may be banded. Indeed, with these species (except the Black Guillemot), we commonly band more adults than young, for the adults in suitable places may be captured from the time the eggs are laid until the young take to the water, while the young leave their birthplaces soon after they are large enough to band, and so are available to the bander for a short time only.

Because of the capture of considerable numbers of adult birds for banding purposes, we obtain every year a fair number of interesting return records of Alcidæ, since banded birds, as well as those not banded, are taken in the cracks. Up to the present these returns on the breeding-grounds, whether secured by others or by me, have been, so far as I know, returns of birds that were banded as adults. I do not know of the recapture, at any breeding-ground, of any Alcidæ banded when juvenile, although several birds so banded have been reported from other points, such as places in the winter range.

There are probably two reasons for this state of affairs. In the first place, when once a Puffin, Razor-billed Auk, Common Murre, or Black Guillemot has laid an egg in a certain place, it seems to return to that place with great fidelity in succeeding years. A shift to another place is seldom made unless it is forced upon the bird by ice or snow covering the chosen place

so late in the season that egg-laying must be done elsewhere, if at all. Because of this fidelity to a breeding-place once used, we obtain a much higher proportion of returns from birds banded as adults than we should do if the breeding population shifted about or exchanged places each year, for birds incubating in places where they are readily captured may be taken again and again, while great hosts of others, in inaccessible places, are never taken at all. When birds banded as juveniles begin to breed, they presumably may select any available sheltered place in the colony, or perhaps in a group of colonies, and many of them will be in the places inaccessible to us or so open that the birds cannot be cornered there. The chance that a bird banded as a juvenile and arrived at breeding age will breed in a place where we shall capture it is therefore much less than is the chance that an adult that has already been captured and banded as such will breed in a place of that character.

In the second place, there is doubtless with these, as with most birds, a comparatively high mortality in the juvenile and adolescent stages of their existence, when they are inexperienced and not at full strength, so that the proportion of banded juveniles surviving one year after banding is much less than the proportion of banded breeding birds so surviving. It has often been pointed out that the average mortality rate of a species is equal to, and therefore readily obtainable from, its average rate of reproduction. From either of these facts may be derived the average age of an individual of the species, which then commonly appears surprisingly low. More useful for many purposes would be a knowledge of the rate of replacement of the breeding stock, which would be correlated with the average age reached by those individuals that arrive at breeding age. That the average age reached by such individuals would, in many cases, surprisingly exceed the average age reached by the entire species I do not doubt. For the purpose of obtaining such information a sharp distinction should be made between mortality suffered prior to reaching breeding age and mortality suffered later in life. The fact that the Puffin, Auk, and Murre hatch only one young bird *per annum* for each breeding pair, and the Black Guillemot only two young *per annum* for each breeding pair, indicates a comparatively low mortality rate for these species, all ages included, and if, as is probable, a rather high percentage of this is suffered in juvenile and adolescent life, the mortality rate for adults would be expected to be markedly low, and some of them should reach a considerable age. Some of the data ob-

tained by bird-banding are beginning to furnish support for this view.

On July 24, 1923, at St. Mary Islands, Saguenay County, Quebec, (north shore of the Gulf of St. Lawrence, the particular island in the St. Mary group unfortunately not recorded) I captured an adult Puffin and banded it as No. 210439. This bird was recaptured, on June 28, 1927, in a burrow on Western Island, of the St. Mary Islands group, by Mr. C. H. Watson, of Andover, New York, who photographed it and released it. On July 24, 1927, I recaptured it at the same place, and, because its band was badly abraded, I rebanded it as No. 497520. On July 31, 1929, this bird was again captured by me on Western Island, examined, and released. It was then at least seven years old.

Another Puffin, recaptured by me on the island called "The Black Land," in Wolf Bay Bird Sanctuary, Wolf Bay, Saguenay County, Quebec, on August 9, 1929, wore a band that could be read only as No. 2265—, the last two figures being worn off. Examination of the hundred records of birds banded with numbers in the 2265— series shows that only two of them, Nos. 226504 and 226505, were Puffins, and that both of these were banded as adults by me on The Black Land on July 20, 1924. The bird recaptured this year was therefore at least six years old at the time. It was rebanded as No. A606218 and released.

An adult Common Murre that I recaptured on Eastern Island, of the St. Mary Islands group, on August 2, 1929, carried a badly worn band that could be read only as No. 20—89, for the two central digits had been rubbed off. It was rebanded as No. A701694 and released. Fortunately, on searching the Canadian bird-banding records in the head office at Ottawa, I find that only one Common Murre has received a band corresponding to the readable figures on this old one. That bird is No. 204689, which was banded as an adult by me on July 21, 1923, at St. Mary Islands. It was therefore at least seven years old when recaptured in 1929.

It may also be noted here that the 483 Common Murres banded as adults by me prior to 1929 (1923 to 1928) have so far yielded 14 "dead" recoveries, or 2.9 per cent of the total. The 152 Common Murres that I banded as juveniles during the years 1923 to 1928 have so far yielded 14 "dead" recoveries, too, but two of these deaths took place two years after banding and one took place three years after banding, leaving 11 that took place within one year of banding and that may be reckoned as adolescent mortality if we assume that these birds

begin to breed in their second summer. This is 7.2 per cent of the total number of juveniles banded. While these figures cannot be taken as indicating the entire mortality for the birds in question at the ages given, they may be considered as roughly comparable, each with the other, and, used in this way, they show a mortality in the eleven months or so of first-year adolescence that is about two and one half times as high as the mortality of the adults over a period averaging three and a half years per bird. To the "adolescent" mortality should be added the strictly "juvenile" mortality of the first month after hatching. There are no data available on this, for ordinary banding methods are not suitable for marking newly hatched young, and, so far as I know, the detailed, daily observations of a definitely limited group of Common Murres on their breeding-ground that would be necessary to obtain such information have not been made. The need for the making of such observations is just one example of the many existing opportunities for advancing ornithology by persistent concentration on a single problem for a few weeks or months. I cannot personally undertake the solution of this particular one because my duties require me to move from place to place frequently when I am in the region where these Murres breed. However, I know that the juvenile mortality rate of Common Murres is generally low as compared to that of other species, for the single chick of a pair is very solicitously cared for, and is generally either in some secure crevice in the rock or in the midst of a fairly compact group of its species, capable of warding off the usual enemies other than man. Let us assume that the mortality for these birds in the month of juvenile life is three fifths of the adolescent mortality of the succeeding eleven months, or is one and a half in the scale in which the latter is two and a half. Then the total mortality of the first year is the sum of these two, that is, four times the adult mortality of a similar number of birds over a period averaging three and a half years per bird, or fourteen times the mortality of the adult birds in one year. This is probably a reasonable comparative figure, which shows that the assumptions so far made are fairly reasonable.

Now to obtain from these data the rate of replacement of the breeding stock and the average age reached by those individuals that reach breeding age, assuming that the total population of the species is stationary from year to year:

Let x = the number of deaths in one year among 200 breeding adults.

Let y = the number of deaths in one year (the first) among the 100 offspring of these 200 birds.

Since the mortality among the young is, in the year, fourteen times as great as the mortality among a like number of adults, but the number of the parents is twice as great as the number of their young,

$$(1) \quad 14\left(\frac{x}{2}\right)=y$$

And since these 300 birds will be reduced to 200 when the breeding-season comes around again, the total number of deaths in the entire group in one year will be 100, that is

$$(2) \quad x+y=100$$

Solving these two simultaneous equations we find that the number of deaths in the year among the 100 young is 87.5; that is, their mortality for the year is 87.5 per cent; and the number of deaths in the year among the 200 adults is 12.5; that is, their mortality is 6.25 per cent a year. The rate of replacement of the breeding stock is the same as the mortality, or 6.25 per cent per year. Of any 100 birds just arrived at breeding age an average of 6.25 will die annually, and all will be dead at the end of 16 years. The average number of years that they will have lived after reaching breeding age will be, if the mortality among the breeding birds is evenly distributed, just half of 16 years, that is, 8 years. By adding to this the 1 year that they required to reach breeding age, we find that, *on this basis*, the average length of life of those Common Murres that reach breeding age is 9 years.

In considering this result it must not be forgotten that we have *assumed* that Common Murres begin to breed when one year old, that the "juvenile" mortality in the first month after hatching is three fifths as great as the "adolescent" mortality of the succeeding eleven months, that eggs lost are soon replaced, that the species is stationary in numbers from year to year, that all birds of breeding age actually breed, and that the mortality among the breeding birds is evenly distributed. When we have *facts* with which to replace *reasonable assumptions* on all these points, we can replace our tentative results with positive ones.

All of the 14 recoveries obtained by banding young Common Murres are those of birds killed by man, and 12 of the 14 recoveries obtained by banding adults of this species are those of birds killed by man or man's dog. The 2 other recoveries

from birds banded as adults are from birds reported as "found dead," which may or may not have been killed or wounded by shooting. Almost all the Murres reported as shot were killed around the coasts of Newfoundland, where birds of this species are esteemed as food and are not protected by law. Of course, the Common Murres banded are also providing, as has been pointed out, many useful return records at the breeding-grounds, where the birds are caught and released uninjured.

The most southern recovery so far reported for any of the Common Murres banded by me is that of No. 334184, which was banded as an adult at Wolf Bay, Saguenay County, Quebec, on July 27, 1925, and was found dead and floating on an arm of the sea at Comeau's Hill, Yarmouth County, Nova Scotia, about the middle of April, 1927.[1]

I have already published[2] the statement that of 172 adult Common Murres banded by me in 1925, without any attempt to select a particular form, 27, or 15. 7 per cent, were of the "Ringed" form, with white eye-ring and white line behind the eye. Using the larger number of similar data now available, I find that, of 724 adult Common Murres that I have caught and banded on the north shore of the Gulf of St. Lawrence in the years 1923 to 1929, inclusive, 128, or 17.7 per cent, were "Ringed" Murres. These are well scattered among the other other Common Murres, some being present in every breeding group of any size. For example, on August 3, 1929, we found on the Eastern Island, St. Mary Islands, in a small cavern with small outlets, a group of breeding Common Murres that was new to me, and that, from the nature of their breeding-place, we were able to pen in and capture very successfully, so that we banded nearly all the adult Murres that were within the place when we arrived there. From that one breeding group of Murres we banded 50 adults, which is the largest number that I have ever succeeded in banding from one group at one time, and among those 50 there were 8 "Ringed" individuals, which thus formed 16 per cent of the adults handled there. The data given are adequate, I think, to justify the general conclusion that, along the north shore of the Gulf of St. Lawrence, "Ringed" Murres form 16 to 18 per cent of the total population of adult Common Murres. Recaptures of Common Murres of both phases from time to time have never shown an instance where one phase had altered into the other. Each appears to be constant throughout life.

[1] *Can. Field-Nat.*, XLII, No. 4, Apr., 1928, p. 110.
[2] *Bull. N. E. B. B. A.*, II, No. I, Jan., 1926, pp. 2-3.

I have never found a group of breeding Murres composed solely of "Ringed" birds, nor have I any other observation, however slight, that would lead me to think that the "Ringed" individuals may constitute a separate species.[1]

It is a common thing for adult Murres, Auks, and Puffins, when released after banding, to take such hurried and ill-directed flight that they dash themselves headlong against some rocky projection and fall discomfited to the ground. The fact that when getting under way in flight they commonly lose altitude for at least a rod or two before they begin to rise is partly responsible for this. Usually, after such an experience, the bird is up and away again without a moment's loss of time, and, before it finally succeeds in getting safely out on or over the water, it may suffer several such terrific collisions without apparent harm. A "Ringed" Murre banded on August 2d last was more unfortunate than usual, for in its first flight after release, it crashed against the perpendicular side of a large boulder, fell to the ground, and was unable to rise again, for it had broken one wing. When its condition was seen, it was put out of its misery.

A juvenile Razor-billed Auk, No. A606034, banded on Middle Island, St. Mary Islands, on July 31, 1929, was peculiar in that its right foot, instead of being solid black, was albinistic distally for more than half of its extent. On the upper surface of the webs the albinistic area extended farther back, nearly all the way across the foot, than it did on the lower surface of the webs. There were a few small black pigmented spots on the upper surface of the webs, on the proximal part of the albinistic area.

During the summer's banding activities, we recaptured nine Razor-billed Auks that I had previously banded as adults in this region. Of these, four had been banded in 1925, four in 1926, and one in 1927. In each case, as far as could be determined, the banded bird was retaken at or near the place of banding. Eight of the nine had to be rebanded because of serious abrasion of the old band, which had generally obliterated some part of the number, in some cases rendering individual identification impossible, although the year of banding was determinable from the part of the number showing the series to which it belonged. It is a problem to prevent such

[1]The photograph, taken by me on August 4, 1928, appearing on the cover of this number of *Bird-Banding*, is used by courtesy of the National Parks of Canada. It shows incubating Common and Ringed Murres on Egg Rock in Cape Whittle Bird Sanctuary, Saguenay County, Quebec. The editor states that the photograph has been somewhat reduced in size and that a partially shown Murre has been stippled out by the engraver.

defacement of bands on these birds, for they have the habit of standing with the entire tarsus flat on rough rock surface. However, their tarsi are somewhat flattened, and, by shaping the band carefully to the tarsus, it may be prevented from revolving about it, and thus the number may be kept uppermost, preventing at least the greater part of the damage.

An adult Black Guillemot, No. 362528, that I had banded on the Middle Island, St. Mary Islands, on August 3, 1926, was recaptured there by Edmund H. Fletcher on July 17, 1928, and was again captured there by me on July 31, 1929. When examined by Mr. Fletcher, this bird's band-number had lost two figures by abrasion, and when reëxamined this year, it had lost another figure, but it happens that it can still be identified individually by the three remaining figures, since the species is known with certainty, and the possibilities are therefore much restricted.

Of 101 juvenile Ring-billed Gulls that were banded on an island at the mouth of Kégashka River on August 10th, three have already been reported from the United States. No. A606369 was found dead at Franklin, Maine, on November 2, 1929; No. A606346 was found dead on the island of Chappaquiddick, near Edgartown, Massachusetts, on November 13, 1929; and No. A606294 was shot at East Moriches, Long Island, New York, on November 18, 1929.

The birds newly banded during 1929, are, by species:

Puffin (*Fratercula arctica arctica*)	41
Black Guillemot (*Cepphus grylle*)	50
Common Murre (*Uria troille troille*)	247
Razor-billed Auk (*Alca torda*)	224
Great Black-backed Gull (*Larus marinus*)	23
Herring Gull (*Larus argentatus*)	143
Ring-billed Gull (*Larus delawarensis*)	200
Coues's Caspian Tern (*Sterna caspia imperator*)	23
Common Cormorant (*Phalacrocorax carbo*)	4
Double-crested Cormorant (*Phalacrocorax auritus auritus*)	78
Total	1033

THE BANDING OF CHIMNEY SWIFTS AT CHATTANOOGA, TENNESSEE

By WYMAN R. GREEN

By way of introduction to this account of the banding of Swifts (*Chætura pelagica*) at Chattanooga we can do no better than to quote from an interesting book by Dr. Alexander Wetmore, Assistant Secretary of the Smithsonian Institution. The volume is entitled "The Migrations of Birds," and is worthy of the attention of all students interested in this aspect of bird-life. He says (pages 195 and 196), "The chimney swift, found in summer throughout the eastern half of North America from Manitoba and Quebec south to the Gulf Coast, has long been an anomaly, since, though abundant in numbers, its winter home has never been located. In autumn, toward the close of their stay, the birds congregate in large flocks, which roost in certain selected chimneys, or occasionally resort to some hollow tree after the fashion of their ancestors. . . . Migrant swifts pass south to the Gulf coast, where for a time they are extremely numerous, and then disappear, to return at the close of March, and to work slowly northward during April to their breeding grounds. For many years they were wholly unknown south of our limits, but recently a few have been recorded in April in Haiti, apparently in northward migration. We may suppose that their winter home is somewhere in the northern part of South America, though this remains to be definitely ascertained."

Obviously much remains to be discovered about the migrations of this bird, and it is in the hope of interesting more banders of eastern North America in the banding of Swifts that the writer ventures to publish this preliminary account of his own work. We have during the short time that we have been working on this project, accumulated some most interesting data, as the accompanying tabulation shows. But in the solution of the many problems connected with the migrations and other habits of any species of bird the coöperation of many workers in widely separated localities is needed. In the migration paths of these birds they sometimes frequent large chimneys in thousands. Bird-students who are located in or near cities, or even small villages are likely to find that the Swifts visit the larger chimneys in small numbers on their northward route, and in much larger numbers on their southward migration. Here in Chattanooga we have taken as

This map indicates some of the most significant results so far obtained in this study of the migration of Chimney Swifts. The banding was done at Chattanooga, Tenn., (CH). Swifts were taken which had been banded at Thomasville, Ga., (T); Lafayette, Ind., (L); Charleston, W. Va., (C); and at Kingston, Ont., (K). Some of our birds have been recaptured at North Bay, Ont., (N). The study indicated a number of migrations of minor importance which are not shown on the map.

many as seven thousand in one catch. We have taken birds from the chimneys of our college buildings on the campus of the University of Chattanooga, from the chimneys of neighboring high school buildings, and from a chimney on a tall building in the heart of the city. The work of setting the trap, and the banding operations also are carried out with much greater facility on flat-topped buildings, for it is very desirable that all birds be banded as soon as possible after trapping. Thus, if it can be done on the roof, so much the better.

Swift-banding is in a category by itself for the reason that, for a given expenditure of time and energy, the results are so much greater. The cost in effort, time, and money is, as we shall try to show, practically negligible. In the less than two years that we have been banding Swifts we have had some remarkable results. Some of our banded Swifts have been

recaptured in Ontario, Canada, and in other remote localities. We have captured Swifts which had been banded in Canada, Indiana, Pennsylvania, West Virginia, and southern Georgia, and very recently one of our Swifts was taken in Ohio. These are certainly most interesting results to secure in so brief a time.

Reference to our table will disclose the fact that we have trapped a total of 12,650 Chimney Swifts, and banded 3,737 of them. We set our trap only five different times. Our average catch was thus over 2,500 birds. It seems to the writer that all banders of other birds who can possibly find the time should add Swift-banding to their activities if they have not already done so. Many banders of other birds are now entering this field also. The Bureau of Biological Survey at Washington was unable to supply the workers with the Number 1 bands last year. The writer was obliged to release 8,914 Swifts because of not having the bands for them. The survey, however, is preparing to supply this size in large numbers next year. We are requesting 15,000 bands for our use here at Chattanooga during September and October of this year. The Swifts pass through this locality going north in April and May. Sometimes they congregate in chimneys in small numbers during these months. They have not done so in this locality this year, though numerous single individuals have been observed. We can offer no explanation as to these differences in behavior from year to year. In all probability, however, they are correlated with seasonal variations.

Of course on the northward migration the Swifts are seeking nesting-places and they spread out, pair, and rear their broods wherever they can find suitable locations for doing so. Then in the late summer and fall they congregate, augmented by the young broods, and in this latitude, after inhabiting some large chimney for a short time move on south. Our data are not conclusive on this point but indicate that each individual bird does not tarry very many days in one locality. Or, if they do stay several weeks, they do not use the same chimney during the time. This is one of the questions we hope to answer by wholesale banding operations in Chattanooga next September and October.

After this experiment we shall make another progress report. We shall be glad to get in touch with all who have already established Swift-banding stations, for we believe that a mutual exchange of data would be very helpful as well as interesting. Such mutual aid in the form of tabulated progress reports from the various stations will help greatly in maintaining the enthusiasm of the workers. There is always

FIG. 2.

FIG. 2. Our first trap, in use on the main office building of the University of Chattanooga. The sides of this trap were covered at first with burlap, and the transparent sheet of celluloid was placed in a horizontal position. Many birds on striking the sheet would turn back and rest on the burlap walls. We later substituted a sloping transparent sheet and oilcloth walls. On September 21, 1929, we captured 7,000 Swifts with this trap.

FIG. 3. A temporary trap constructed on the fourteen foot chimney of the Clemons Bros. furniture store in the heart of Chattanooga, by Henry Howard a local contractor. On October 8, 1929, we captured over 2,700 Swifts with this trap. Among them were several which had been banded several years before by I. H. Johnston, at Charleston, W. Va., and one banded by S. E. Perkins, the same year at Lafayette, Ind.

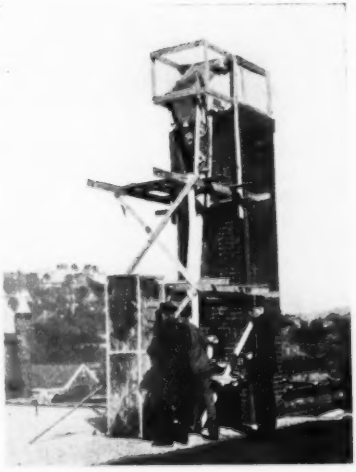


FIG. 3.

much excitement when we capture a bird that has been banded elsewhere. While we have had no difficulty in getting all the help we needed in this work, in some localities such help may not be at hand. If every Swift-bander could have in his possession while banding, a tabulation of data from every other Swift-bander, such as the one presented herewith, when a band-bearing Swift was taken from the receiving cage, he could at once turn to column two and discover who placed the band on it. This information as the work is in progress would make the helpers want to come back and help again. Whether a helper is a business man, a writer, a local naturalist, teacher, poet, or student in college, his imagination is aroused when a bird is captured which has come all the way from Canada, Pennsylvania, Indiana, southern Georgia, or Ohio. Our helpers have ranged through this entire gamut.

We shall be pleased to supply copies of our data to all who care to receive them, at any time. Especially should we like to make the mutual exchange of data, just after the big banding period, that is, about the end of October. Not only do we need to correlate our efforts in this country, but it would be most desirable to interest workers in South America, Central America, Mexico, and the West Indies. Doubtless some of the bird enthusiasts in North America have friends in some of these other countries whom they might interest. No matter what their interests in those countries, they are likely to succumb to the lure if they are asked to help solve such an age-long mystery as locating the winter home of these birds, if it is at all possible for them to do so. The writer is already endeavoring to enter these fields through correspondence with a large number of biologists, other educators, ornithologists, etc., and hopes soon to be in a position to offer valuable data on the southern limits of the Swift migrations. It seems altogether likely that their winter quarters is in the West Indies, South America, or Central America. Dr. Wetmore states that they have been seen in Haiti. It has been rumored that they habitually occupy the crater of an extinct volcano somewhere in the equatorial region during the winter. But about the only satisfaction this affords us is that, if true, it is one more bit of evidence for the naïve theory that everything must have some use. There is probably no better use to which craters may be put. But whether valcano crater, old chimneys, hollow trees, or merely dense tropical forests constitute their winter home, surely every student of birds wishes to know where it is, and by concerted effort we can find out.

FIG. 4. One of our latest traps, with black oilcloth sides, sloping transparent end, and tin funnel. The receiving cage contains about eight hundred Swifts. On October 19, 1929, we captured 955 Swifts in this trap, from the chimney of the Central High School. It is located in the eastern part of the city, about three miles from where we did our other trapping. Among them were Swifts from each of our previous catches.

Although experienced banders need no suggestions as to the most successful kinds of traps to use for Swifts, we shall very briefly describe our methods for the convenience of those who may not have undertaken this work up to this time. The general type of traps we have used are described in the miscellaneous publication No. 58, United States Department of Agriculture. Figure 4 shows one of our most successful traps

in operation. The size and shape of the trap depends largely upon the type of chimney the Swifts are using. The essentials of a good trap are few in number. It is necessary only to have a light wooden framework with cloth tacked on both sides and one end, hardware cloth or screen wire on the top, with the bottom, or at least a large part of the bottom, left open so that Swifts can enter as they emerge from the chimney. One end, as shown in the figure referred to is preferably made sloping, and must be covered with a sheet of transparent celluloid such as can be obtained at any good auto-supply store. Under this slanting sheet of celluloid is a large funnel made of oil-cloth or of tin, into which the birds drop as they fly against it in trying to make their way to freedom. From the bottom of this funnel a stovepipe leads to the receiving-cage below. It should enter the cage a foot or so from the bottom; otherwise the birds tend to pile up on the floor of the cage and smother. The Swifts are so sluggish that they will die rather than make a vigorous effort to creep from under a small pile of their companions for air. It is best to make the bottom of the receiver of hardware cloth and have the cage elevated from the roof an inch or so, in case the catch is to be a large one. One cannot always estimate this, either. On one occasion the writer expected five hundred birds and actually caught seven thousand! Ordinarily they will fly to the top of the cage and attach themselves, where they are likely to hang indefinitely.

While the trap may be made as small as possible considering the size of the opening in the chimney, the receiving-cage should not be too small. Of course small receivers may be more convenient, but in case of a large catch one may need several of them. It is best to let all of the Swifts come out of the chimney when they get ready, for, if hindered too much, they may decide to stay in all day. The receiver should by all means be an open screened box of some kind. We lost a number of specimens by using sacks as receivers early in our experience, and we were as careful as we could well be in the use of the sacks. We even lost a few birds by suffocation in the receiver illustrated in figure 4, and this receiver has a hardware cloth bottom.

We should like to suggest a device which makes the removal of the Swifts from the receiving-cages very convenient. In cases of a receiving-cage six feet tall we would make two openings about seven inches square in each of two opposite sides of the cage, one above the other and so placed that one can reach the birds from some one of the openings in any portion of the cage. We then hang a piece of burlap on the

FIG. 5. Robert Sparks Walker, nature writer and poet, who has solved many of nature's riddles, is helping to solve the riddle of the Swift migrations. (Placing a band.)

inside of the cage over each door. Such doors close automatically as the arm is withdrawn, so that no birds escape. The edges of the openings may be easily covered with a narrow strip of tin, so as to eliminate the likelihood of tearing the clothing while reaching for birds. These luxuries may be dispensed with, of course, but are rather desirable if one is banding large numbers of Swifts. Half a dozen workers can band Swifts around such a cage and not be in one another's way.

A complete discussion of our results would be tedious. In the interest of brevity we have tried to present some of the most significant aspects in the outline map, figure 1, and to show something of how some of the difficulties encountered were

overcome by means of the photographs and the following tabulation:

TABULATION OF DATA ON SWIFT-BANDING AT CHATTANOOGA

Data on Local Banding				*Data on Swifts Banded Elsewhere*			
Date and station	Birds banded. Numbers used	Released not banded	Bearing local bands	Bearing strange bands	Place of banding	Date of banding	By whom banded
Oct. 16, 1928 Old H. S.	1000, B72001 to B73000	900	none	1	Charleston, W. Va.	9/18–1926	I. H. Johnston
				1	"	9/15–1927	"
May 25 1929 Univer.	91, C6410 to C6588	none	none	none			
Sept. 21 1929 Univer.	1500, C23501 to C25000	5500	8 banded Oct. 16, 1928	1	Thomasville, Ga.	10/1–1926	H. L. Stoddard
				1	George School, Pa.	5/26–1927	John Bartram
				4	Charleston, W. Va.	9/15–1927	I. H. Johnston
				3	"	(?)	"
				1	"	9/14–1928	"
				1	Kingston, Ontario	6/7–1929	R. O. Merriman
Oct. 8, 1929 Clemons	1146, C32001 to C32197 and C36051 to C37000	1559	11 banded Oct. 16, 1928 2 banded May 25 1929 4 banded Sept. 21 1929	1	Charleston, W. Va.	9/17–1926	I. H. Johnston
				2	"	9/15–1927	"
				1	Lafayette, Ind.	9/6–1929	S. E. Perkins
Oct. 19, Central H. S.	none	955	7 banded Oct. 1 1928 1 banded May 25, 1929 9 banded Sept. 21 1929 13 banded Oct. 8 1929				
Totals	3737	8914	54				

Since Oct. 8, 1929, we have captured no Swifts which were banded elsewhere.

This table includes data on Chimney-swifts banded at Chattanooga from Oct. 16, 1928, to Oct. 19, 1929, inclusive. A total of 17 were captured bearing strange bands.

Four of our Swifts banded Oct. 16, 1928, have been recaptured elsewhere, one by E. J. Pifher, at Trout Lake, North Bay, Ontario; one by A. Chevrier, at Markstay, Ontario, one by Noah Bales, at Decatur, Tennessee, and one by I. H. Johnston, at Charleston, West Virginia.

Two banded Sept. 21, 1929, have been taken elsewhere; one by C. B. Gardener, at Norwalk, Ohio, and one by A. N. Rueckl, at Luxemburg, Wisconsin.

One which we banded Oct. 8, 1929, was recently caught by Willie Turner, at Rocky Face, Georgia.

BEHAVIOR AND LOCAL DISTRIBUTION OF TUFTED TITMICE IN WINTER AND SPRING

By MABEL GILLESPIE

THIS study is based on data concerning Tufted Titmice (*Bæolophus bicolor*) provided by various field observations and banding-notes collected by John A. Gillespie and the author during the past nine years, and by a more specialized study conducted by the author during the winter and spring months of the present year. Practically all the data have been collected in Glenolden, Pennsylvania, and immediate vicinity. Only occasional observations of Tufted Titmice have been made away from this region. In such cases the birds have have always been observed in woods, usually near water[1] and are found in groups of from two to perhaps six.

The Tufted Titmouse is described by Ridgway (*Birds of Middle and North America*, Vol. III) as "arboreal, omnivorous, very active and essential non-migratory." A survey of many of the lists of birds of given localities published in various numbers of *The Auk* shows that, so far as the information is given, Titmice are found in thick growth and usually near water.

DESCRIPTION OF THE REGION

Glenolden is eight miles southwest of the Philadelphia City Hall, and two miles north of the Delaware River. The Muckinipattus Creek pursues a tortuous course through the Borough, describing a complete letter S. Twenty-five years ago the section south of the Pennsylvania Railroad (see map) was heavily wooded and was famous because of its abundance of beech trees. The plateau within the long loop of the creek has been cleared and developed, but the slopes of the winding ravine are still heavily wooded and largely unspoiled by development. White pines and cedars, reported by early settlers, have all disappeared. About one third of the trees are beech (*Fagus grandifolia*); a large number are tulip (*Liriodendron tulipifera*), with red oak (*Quercus rubra*) and red maple (*Acer rubrum*) in abundance. White oak (*Quercus alba*), black oak (*Quercus velutina*), tupelo (*Nyssa sylvatica*), white ash (*Fraxinus americana*), black walnut (*Juglans nigra*), and sycamore (*Platanus occidentalis*) are common; with thick

[1]Practically all the woodland in this part of Pennsylvania borders the streams. Therefore the presence of water in the habitats of Titmice may be merely adventitious and not essential.

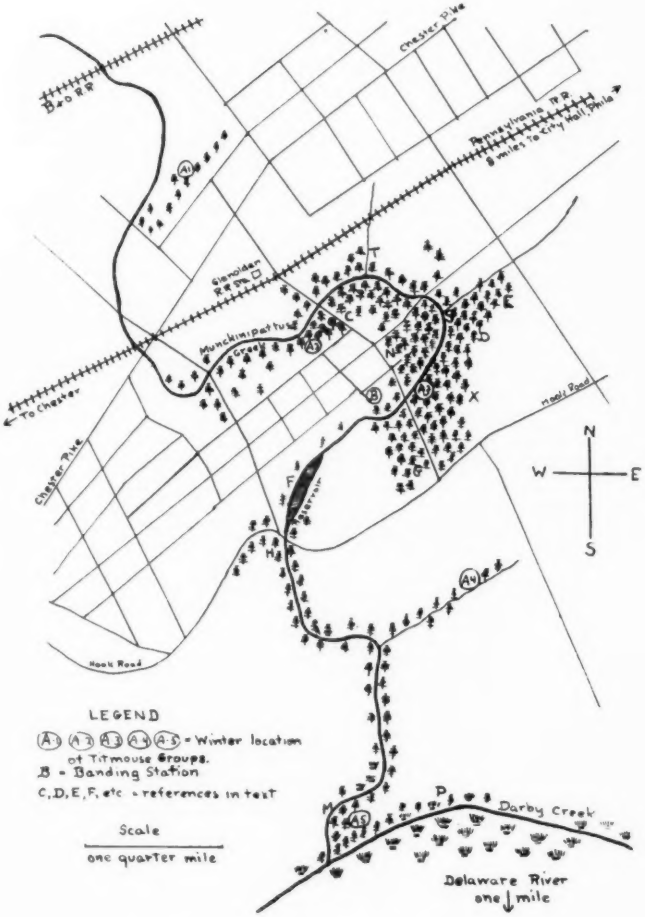
underbrush composed largely of witch-hazel (*Hamamelis virginiana*), spicebush (*Benzoin æstivale*), alder (*Alnus rugosa*), American hornbeam (*Carpinus caroliniana*) and various viburnums.

From the railroad to the bend of the long loop the southern slope of the creek valley is very precipitous, while for nearly a half a mile from this point to the southwest both slopes are particularly steep. Where the valley widens there is a semi-artificial reservoir just above the tidewater limit. To the east and south are extensive truck farms. In the open regions on both sides of the Borough are numbers of "hedgerows" of Carolina poplars (*Populus deltoides*), and along the tiny stream north of Darby Creek is a thicket of sweet gum (*Liquidambar styraciflua*). Along Darby Creek, which flows through extensive marshland, are pin oaks (*Quercus palustris*) and Spanish oaks (*Quercus falcata*) in addition to trees already mentioned, and in the marshes thorns (*Cratægus sp.*) grow abundantly. But the trees are isolated and scattered here, and except at the confluence of the two creeks there is no wooded section. Titmice are never seen in the vast marshy section south of Darby Creek.

This region, situated along the theoretical migration highway of the Delaware Valley, combining forest, meadows, streams and marshes within a little over a square mile, is the most favorable limited area for bird-study in the entire Philadelphia region. Because of this fact it may appear that the Titmouse population would be denser here than usual. However, as will be shown, during some years Titmice are very scarce, while during the season of 1929-1930 they have been reported as common generally throughout the Philadelphia region. Within this region are found commonly such characteristic birds of the Carolinian faunal zone as the Cardinal, Carolina Wren, Yellow-breasted Chat, and Kentucky Warbler, as well as the Tufted Titmouse.

Just how much ecological relation there is between the flora of any region and the presence of Tufted Tits remains to be seen, but it is noticeable from the Christmas census returns in *Bird-Lore* that in a number of cases Tits are not noted in lists that include other characteristic resident members of the Carolinian fauna such as Cardinals and Carolina Wrens. Florence Merriam Bailey[2] gives an example of the absence of Tufted Tits from a region where the tree growth was not such as to provide suitable hollows for nesting-sites.

[2] *Bird-Lore*, Vol. XV, p. 394.



MAP SHOWING REGION ABOUT GLENOLDEN, PA.

ANALYZATION OF BANDING DATA

As above noted, Tufted Titmice are essentially non-migratory birds, and during the winter season their territories are rigidly limited. In some winters they are common, in others they are seldom seen. They wander considerably during early spring and in the fall, keeping together in small groups.

The accompanying chart shows clearly the characteristic appearance and disappearance of Titmouse groups, and the alternating abundance and scarcity of the species. The vertical lines in the section marked "daily reports" indicate the number of times particular mention was made of Titmice in the daily journal of field observations. The vertical lines opposite the band-numbers indicate the times each banded bird was actually caught. A horizontal connecting line indicates the duration of a bird's known existence.[3] As will be explained later, Titmice are very clever in escaping from traps, so these marks do not adequately indicate the frequent presence of Titmice about the banding station. Bird-banding was not begun until the fall of 1922, otherwise Titmice must surely have been trapped in 1921-22.

The daily journal is based on notes of observations made at the banding station (in many cases from within the house), from field observations on short walks taken at least once a week (usually more often), on longer walks taken every week or so, and from the results of general censuses taken four or five times a year over an area of several square miles. Censuses were not taken in 1922 and the early part of 1923. These observations, by the way, were made as a matter of course, with no idea of this special study in mind. On every census Titmice were observed somewhere within a mile or so of the banding station except in December, 1926, and May, 1927. However, since there were scattered reports of them in other months of these years, the likelihood is that they were present somewhere, even though not noted.

It will be observed that Titmice were constantly present during the winter season (October-April) in 1921-1922, 1923-1924, 1925-1926, and 1929-1930. During these seasons (1921-1922 excepted) they were trapped in numbers varying from five to ten. During each of the winters of 1924-1925, 1927-1928, 1928-1929, a group of Titmice wintered in the vicinity, but its members were not commonly found about the banding

[3]This graphical method has been adapted from the similar method used by Rudyerd Boulton and John T. Nichols in *A Method of Analyzing Bird-Banding Data. Bulletin of the Eastern Bird-Banding Association.* No. 2, October, 1925.

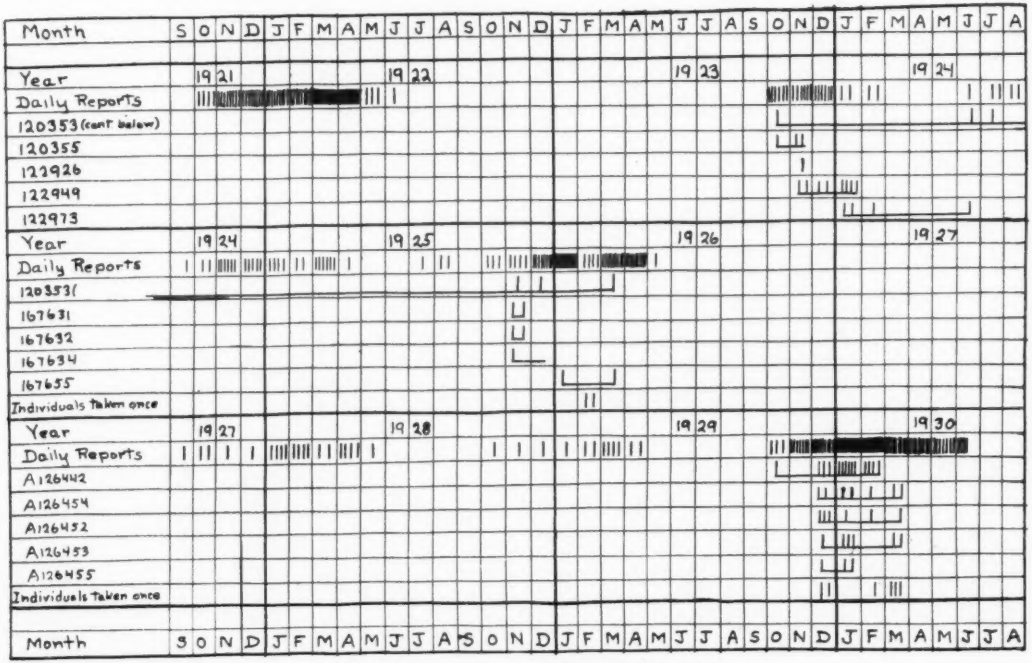


CHART GIVING DATA ON TITMICE GROUPS

station. Sometimes a Titmouse would be observed feeding on suet, and once in February, 1929, a Tit was seen escaping from a trap, but in no case was even a single straggler caught. If one member of a group establishes the habit of coming to the traps, it seems to be inevitable for the rest of the group to follow.

During the winter of 1922-1923 no Titmice were reported, and during 1926-1927 Titmice were reported but four times. Their history for both of these seasons indicates either unusual wandering or a high percentage of casualties.

The fact that the records of the journal of field observations and the banding data correspond so consistently indicates, (first) that Titmice stay rather permanently within somewhat limited areas during the winter, and (second) that when a banding station lies within or near one of these limited areas, there is every possibility of trapping all the members of the group.

If Titmice had been caught in 1927-1928 there would be a perfect alternation of years of abundance and scarcity from the point of view of our banding station locality. In this connection a cursory survey of our observations prior to 1921 when written records start is of interest. We began ornithological observations in Glenolden in the fall of 1918, and in the fall of 1919 saw Titmice for the first time. During the fall and winter of 1920-21 no Titmice were observed. These early observations were quite local, and thus add weight to a theory of yearly alternation. In this connection it will be noted that No. 120353, the only Tit whose history is known for more than one season, was trapped in 1923-1924, and again in 1925-1926, skipping the intervening season. This theory suggests that Tits do not necessarily return to the nesting-territory of the previous season, and that although they are essentially non-migratory, yet they are local wanderers between seasons.

More striking is the suggestion of a four-year cycle culminating in unusual abundance, followed by a marked scarcity in numbers.[1] There is here possibly an example of the phenomenon suggested by Julian Huxley[2] of a three-and-seven-tenths-year cycle which is just one-third of the familiar eleven-plus sun-spot cycle. Huxley has very convincing data to prove the influence of the sun-spot cycle on population density and scarcity among various species of wild life. His

[1]During February, 1926 there is a considerable lapse in our records, so the chart is probably misleading for the month.

[2]*Mice and Men*, *Harper's Monthly Magazine*, Vol. 156, Dec., 1927, pp. 32-50.

theory, in brief, is that the meteorological conditions of the earth caused periodically by sun-spot maxima make for increased productivity of plant life. As a result the growth of small herbivorous animals is stimulated, followed by an abundance of the predatory animals. The resulting population density is attended by epidemic disease which reduces the numbers of a given species to a minimum, and then the cycle is repeated. The average length of the cycle is either just over eleven years, or else one third of this. It will be noted that the chart shows a remarkable scarcity of Titmice during each season following the years of abundant increase. In view of these facts, one is tempted to predict a scarcity of Titmice near Glenolden during the coming winter season.

BEHAVIOR AT BANDING STATION

In no cases do birds of various species show contrasting behavior to better advantage than in their reactions to traps. Birds of some species are notoriously clever at escaping from traps, while those of other species become hopelessly bewildered when trapped. And it must not be forgotten that within a species there is considerable individual variation as to reaction.

Of all the species which we have observed in any detail in connection with traps, the members of none present more intelligence and individuality than Tufted Titmice. During the winter of 1929-1930, a group which has already been mentioned was repeatedly about the banding station. Of the six which seemed to constitute a family group[3], two were not recaptured, one was taken twice again, two were captured five more times, and one six times. Besides this group of six there were four stray individuals, one of which, No. A126442, was banded October 31, 1929, repeating fourteen times up to February 14, 1930; while the other three appeared in the early spring.

The number of captures, however, gives no adequate idea of the frequency of repeats. Probably not a winter's day passed that one if not all of this group failed to enter the traps for food. We used a regulation government funnel trap, a round house trap, an oblong funnel trap, a flat trap operated sometimes by a pull-string but more often by an automatic trigger, and a suit-case trap operated by a pull-string. With

[3] An elaboration of the theory that small groups of birds represent family units is presented by Charles L. Whittle in *Some Aspects of the Group Habit Among Birds*, *The Auk*, Vol. XL, No. 2, April, 1923.

but one or two exceptions, our only success in capturing a Titmouse after the original capture was to secure it in a pull-string trap. The Tits learned very quickly how to find their way out of the other traps. Dozens of times I have watched from a window, and usually the bird under observation picks up a bit of food and at once flies out, with no time lost in searching about for the entrance. From a convenient tree near by the bird usually eats the morsel, and then returns to the same trap or to another for more food. I have seen one fly with its bait from the interior of the oblong funnel trap to the top of the government funnel trap, there to partake of its feast. The moment it had swallowed the bait, it dropped quickly to the ground directly in front of the funnel entrance, entered, picked up another morsel, and was out again in record time. So quick are the actions of Titmice in most cases that even when they enter a pull-string trap it is extremely difficult for the operator to act quickly enough to make a successful capture.

Incidentally, the appetites of Titmice seem insatiable. Accurate comparisons are, of course, impossible, unless the actual food requirements of a Titmouse could be determined for an entire day. But Titmice eat far more from the feeding stations and trap bait than birds of any other species. A great deal is consumed on the spot, and some is carried away.

It is often possible with birds of other species that "learn the combination" of traps, to confuse them when they are within a trap by running toward them. They usually flutter hopelessly about instead of collecting their wits and finding the exit. This scheme does not work with Titmice, however. Approaching danger seems only to stimulate their keenness and composure, for they most contaimedly and successfully seek the exit at the first hint of hazard.

This ability to find both entrance and exit without hesitation or search is apparently due to accuracy of memory. The following incident substantiates this theory. During one night there was a fall of very soft snow, with a succeeding drop in temperature. The traps were all removed but one lest they should become frozen in the ice crust. After the freezing the outline of each trap was clearly visible in the crust. A Titmouse was seen to fly to the ground at the spot directly in front of the outlined mark of an entrance funnel. This showed that the bird clearly remembered the location of the funnel. Then, however, just as it was about to run forward, it appeared to realize that the trap was not there. The food was directly in front of the bird with no intervening obstruc-

tion. Yet the bird hesitated, looked about, and observed that another trap was in its accustomed place. It flew to this trap and entered for food.

No. A126442, above mentioned, never seemed to acquire the ease in escaping from traps manifested by the members of the group that appeared later. According to the records, it was taken in the round-house trap three times, in a pull-string trap once, in the oblong funnel trap five times, and six times in the government funnel trap. Once it was observed in the oblong funnel trap for fully a half-hour, feeding contentedly. Then it found the way out without difficulty. At this time it flew into a sheet hanging on the clothes-line and dropped to the ground, stunned. An attempt was made to pick up the bird, but it flew weakly about in circles and finally lit on the branch of a tree, beyond reach. In nine days the bird was captured again, none the worse, apparently, for this experience. During the last week it was handled, it was frequently taken away from the station for release, and though it returned from short distances, it has not been seen since the last release some miles away. As the mating-season was at hand, it would be likely to stay wherever it could find companionship.

The last week in February I started to use colored celluloid bands in order to be able to distinguish individual birds at sight. The method of preparing these was suggested by Wilbur K. Butts. No. A126452 had a red band placed on the left tarsus, and, though subsequently captured but once, was observed about the banding station and in the traps on ten days in March and on one day in April, being seen several times on some days. This shows more conclusively than ever the persistency with which these Tits came to the traps. It must be remembered, moreover, that such data depend on getting a good enough view of the bird to see the colored band, which is difficult with such active, restless birds. Two other Titmice, with colored bands on the tarsi, were also seen on succeeding days.

C. McCoy Franklin, of the Crossnore School, North Carolina, who speaks on the birds of that region, believes that Titmice stay mated for life. He has had the opportunity to observe birds closely, albeit unscientifically, and he did not make the claim about birds of any other species. Therefore the statement, though unproved, is challenging, indicating that from the observed habits of Titmice permanent mating seems more probable than among many other species. The tendency of these birds to remain in probable family groups would keep a

mated pair together until time for another mating. Exactly what happens then remains to be discovered.

Further manifestations of the group habit are shown in the tendency of Titmice to "stand by" when one of their number is in difficulty. As already mentioned, it is seldom that a Titmouse is unable to leave a trap, but when one fails to get out there is almost always another Titmouse near by (usually but one), calling excitedly, and waiting for its comrade. Often the concerned Titmouse will perch on the top of the trap in which its comrade is imprisoned, and it will continue to call until the captured bird is released.

This habit would seem to indicate true courage, for Titmice, in this region at least, are nervous, wary creatures.[1] I find it possible to watch birds of most species from a window since the birds are not alarmed as long as I remain motionless. A Titmouse, however, will see a human being every time unless there is a concealing sash curtain, and it will detect motion behind a curtain, and in either case it flies away instantly.

WINTER DISTRIBUTION

During the late spring, summer, and early fall, Titmice tend to disappear. This disappearance indicates a period of retirement during nesting and the subsequent annual molt. At this season the birds are in the secluded depths of woods and are unaccustomedly silent. In the fall they appear in small groups, which, as far as they can be counted, vary from two to at least six. Presumably there is more or less wandering at this time, but the tendency apparently is to choose a favorable location in which to spend the winter, and then to remain within a rather limited area.

The group habit and limitation of wanderings are clearly illustrated by our records. It has already been noted that, during some winters when Titmice were reported rather consistently from the field, they were not trapped. In the past winter the group of six, a probable family group, appeared late in December, and were all captured between the 26th and 30th, four of them being recaptured at intervals. This group had a very definitely limited winter area. To the southwest of our banding station the slope of the ravine and the bottomland are covered with but low second growth and underbrush, and

[1] So far I have had no experiences of intimacy with Titmice such as have been reported by various observers. See *Bird-Lore*, Vol. VI, p. 205, and Vol. XXVII, p. 180, for accounts of Titmice that pulled hair from human heads for nesting material; also Vol. VII, p. 21, and Vol. XV, p. 173, for accounts of Titmice that took food from the hand.

the Tits have never been observed there in winter. To the northeast the creek flows nearly straight for a quarter of a mile. An embanked road crosses the ravine midway of this distance at right angles to the creek. The creek and road thus divide nearly a quarter of a square mile into four sections of varying areas. Our section, which is not heavily wooded, is the western one. The southern section directly across the creek is very heavily wooded, but the Titmice were not seen there during the winter. Instead they flew from our banding station across to the two wooded slopes to the northeast of the embankment, and at any time when they were not near the banding station, might be found within an area less than a quarter of a mile in diameter with its center at A3. It seems rather likely that they wandered beyond what would otherwise have been their area limits in order to secure food at the banding station, since they did not roam as far from A3 in any other direction.

Further observations of the distribution of Titmice come from the notes of field observations during the fall and winter of 1929-1930. Four other groups of Titmice were found within the range of fairly frequent field trips. With the exception of the Tits at A3, the members of the other groups were unbanded as far as could be observed.

Half a mile to the northwest, the creek flows parallel to the present limit of settlement on the other side of the Borough. Here there is a narrow strip of timber with thick undergrowth between the houses and the creek, and meadow beyond the water. On every occasion when we visited this region in the winter months, a group of Titmice was observed within the same restricted area (A1).

Two blocks to the northwest of the banding station at least two Titmice were regularly observed. This area (A2) comprises thick woods along a steep slope.

Nearly a mile to the south of the banding station the creek joins the larger Darby Creek, each stream being thinly bordered by trees and rather wild undergrowth. During the past winter Titmice were always seen or heard in the vicinity of this confluence (A5).

Half a mile to the southeast of our station a very small stream flows through cultivated fields. At one point along this stream (A4), which is very narrowly bordered by trees and shrubs, we never failed during the past winter to observe Titmice, usually about four.

These groups, together with the banded Titmice at A3, constituted five groups, definitely located for the winter. No stragglers were observed elsewhere in the above-described

region during the winter season, and no groups had territories that overlapped.

A check on this winter count of Titmice came from three members of the Delaware Valley Ornithological Club who one morning covered the territory within which these five groups were located, and who reported a total count of twenty or more Titmice.

SPRING WANDERING

The preliminary activities of the mating-season start early with non-migratory birds of the Carolinian fauna. A Titmouse was first heard in full song on January 5th of this year, though the temperature ranged from twenty-four to forty degrees. The song season was fully established by the end of January, and it increased in intensity each day. By the middle of February, Titmice were very noisy, and started singing in the morning before it was fully light.

At about this time there came intervals of two or three days when Titmice were not observed at the banding station, and at about the same time they were found in territory outside their circumscribed winter areas. On March 7th a Tit was observed in the shrubbery at F. On the 9th a group was seen between M and B. On the same day several Tits were seen at F, and one new one was trapped. By the middle of March they came to the banding station only at breakfast time as a rule. On March 22d, when it was unusually cold with a high wind, there was no sight nor sound of a Titmouse all day. The following day a new one was trapped.

On March 30th I thoroughly surveyed all the territory south of the Pennsylvania Railroad, starting at 6.45 a.m. Titmice were observed at D, B, H, M, P, and midway between H and M. On April 4th most of the same territory was covered and Titmice were observed only at M. On April 5th the territory between the railroad and Hook Road was covered and Titmice were observed only at E and B. No Tits were observed during local investigations on the next two days, but on the 8th they were heard at A3. They were heard about the banding station on the 9th, and on the 10th one was about the banding station frequently during the day. On the 11th I covered most of the territory south of the railroad, and discovered Titmice at H and M. On April 13th two were found at E. On the 15th one was heard below F. On the 19th two members of the Delaware Valley Ornithological Club covered the territory south of the railroad and reported Titmice at A3 only. On the 20th they were heard about the banding station

at 7.30 in the morning. On several days following one was heard at S. On several days during late March and April they were heard near G. The territory at A1 was visited briefly about eight times. Sometimes Tits were heard near by, but more often not.

The data of the foregoing paragraphs are sufficient to indicate a restlessness among Tufted Titmice in the spring, and a wandering, which, though local, is striking compared with the limited areas of winter, or compared with the permanent areas of Cardinals, for instance. There is more, however, than the abandonment of winter territories to be considered. Spring undoubtedly brings about a radical change in Titmouse diet. According to the United States Department of Agriculture, this diet is 66.57 per cent animal and 33.43 per cent vegetal. According to Forbush ("Birds of Massachusetts and Other New England States") the animal diet consists largely of caterpillars and wasps, but includes some larvæ, scales, and eggs. Only the three latter could be obtained in winter, and the diet then must necessarily be composed more largely of vegetable matter. The latter consists (Forbush) of wild berries, seeds, and the softer-shelled nuts and acorns. Thus the winter diet would bring Titmice nearer to the ground and more frequently into the open than the summer diet. The latter would be found to advantage in the treetops.

Among foods listed by Florence Merriam Bailey (*loc. cit.*) are beechnuts, acorns, and berries of the dogwood and Virginia creeper. This locality provides plenty of beechnuts and acorns while Japanese honeysuckle (*Lonicera japonica*) berries and alder seeds are favorite bird foods in place of the berries of dogwood and Virginia creeper, which are much less common. Also the seeds of tulip-tree pods are much sought as food. In the winter Titmice may be observed feeding both in the treetops and near, if not on, the ground. At this time they can be tempted by suet, nuts, soda crackers, and sunflower seeds at feeding stations. During the spring they take to the treetops and seldom come down. The one capture in May, 1924, and the two in June of that year can perhaps be explained by the necessity of feeding young birds.

As a further example of the change in diet, corresponding to changes in season and habitat, is the fact that the Tits wintering at A4 spent their time in a thicket of sweet gum trees that could not, by any stretch of the imagination, be considered real woods. They even wandered out of the thicket and were more frequently found a few hundred feet away in the alders and weeds along the tiny stream. But they were

never seen anywhere along this stream after the period of spring wandering had started.

The nesting and summer activities of Tufted Titmice provide a study upon which little data have been obtained, largely perhaps for the reason that adequate observations are extremely difficult. Although I found Titmouse wary during the winter, they were noisy and not secretive. After mating a decided change takes place. Their calls are rarely heard, they stay high in the trees and are well hidden by foliage, and they defy attempts to follow their movements. Their territories are fairly extensive and they move swiftly from one end to the other, making it impossible for an observer to keep up with them. They are perfectly aware of the presence of human beings, and though they may call before one enters and after one leaves the woods, they will be silent for hours while one waits.

Two facts will indicate more definitely the elusiveness of Titmice in late spring and summer. First, it has been brought to my attention that one of the most active egg-collectors in the Philadelphia region has never succeeded in finding a Titmouse nest. Second, it was not until after the start of this year that I realized the possibilities of the data presented in this paper and resolved to pursue a more intensive study of Titmice; and yet, with a far greater expenditure of time and effort, I have acquired practically no data on nesting activities. A pair occupies the territory between A2 and T, another pair the territory between N and E, and a third roams between X, G and B, but no nests have been located.

CONCLUSION

The organic environment influences the presence and extent of Titmouse population. Titmice are definitely birds of the woodland and must find adequate food and nesting-sites in their chosen habitats.

Banding data and field obervations correspond rather consistently to indicate the presence or absence of Titmice. The results of twelve years' observations show a tendency toward alternate years of presence and absence about the banding station or near vicinity; and a peak of population density every four years, followed by a scarcity of numbers.

Titmice are extremely quick in action and clever in emergency; they are social in small groups, and in this locality are very wary of human beings.

Their territorial distribution varies with the season. In

winter small groups suggesting family units occupy very definite and limited areas, never overlapping. Early in March they become restless and wander considerably, prior to mating and nesting. Change in diet effects their habits still further, keeping them in the treetops in spring and summer, but bringing them nearer the ground for seeds and about feeding stations in winter.

A study of the nesting and summer activities of Titmice offers a fascinating challenge for the future.

Glenolden, Pennsylvania, May 30, 1930.

A LIST OF THE ACTIVE BANDING STATIONS IN THE TERRITORY OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION

By CHARLES B. FLOYD

THE object of this paper is to acquaint the readers of *Bird-Banding* with the locations of the active banding stations in the territory covered by the Northeastern Bird-Banding Association; to enumerate any special or general work that coöperators are undertaking, and to list the species that are most abundant about each station.

It is obviously impossible to record everything of interest concerning each station, and it is hoped that no readers will feel slighted because only occasional comments on their work are made.

A glance at the accompanying map shows at once the need for more banders in all parts of the territory of this Association, and particularly in the probable migratory highways where there are now almost none. If the valleys of the Connecticut and Merrimack Rivers, for instance, were dotted with banding stations, it is believed that much information regarding migration could be gathered. The writer particularly wishes to impress upon those who are interested in the work but who hesitate to undertake it because they feel that what limited time they can devote to it would not be sufficient to accomplish things worth while, that more collaborators are needed, however little or much they can do. It often develops that a bander becomes so interested in the operation of a station that his affairs can be rearranged so as to permit giving more time to this work than at first seemed possible.

Notes regarding the stations in each State or Province making up our territory follow, the arrangement being alphabetically by towns:

MASSACHUSETTS

Amherst: Mrs. Hildegard C. Thorp maintains an active banding station and handles principally White-throated, Tree, Song, and Fox Sparrows and Juncos. The past winter she banded a Sparrow Hawk and a Sharp-shinned Hawk, which were captured in her traps.

S. P. Hayes, Jr., is an active bander, taking chiefly White-throated and Tree Sparrows and Catbirds.

Mrs. J. S. Chamberlain is doing fine work with Chickadees, Tree and White-throated Sparrows, and Juncos. She is now to be away for a year, and Mrs. L. M. Cutler will operate her station.

Athol: Robert Allison is an active bander, working largely with Purple Finches, Tree Sparrows, and Juncos.

Auburndale: Dr. Eugene U. Ufford maintains an active station, trapping a variety of birds throughout the season. He has taken Tree Sparrows in numbers.

Charles B. Floyd also has a station here where Blue Jays and Bronzed Grackles are banded. His summer banding operations are at Chatham, Massachusetts.

Belchertown: Dr. George E. McPherson conducts a fine station, taking many Juncos. Among his interesting bandings are one Prairie Horned Lark and four Snow Buntings.

Brockton: George H. Priest is an active collaborator and was one of the first to trap Evening Grosbeaks.

Cambridge: Prof. F. A. Saunders has a winter station at Cambridge and a summer station at Kittery, Maine.

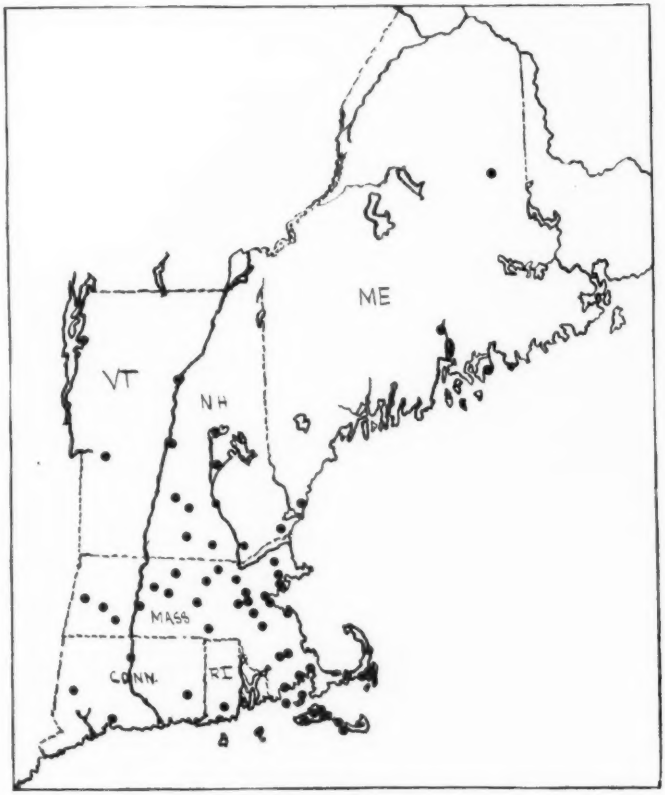
Chatham: Everett Eldridge, Jr., opened an interesting station a few months ago, and, in addition to song and insectivorous species, he has banded Loons and American Eiders and assisted Charles B. Floyd in the work with Roseate and Common Terns on Tern Island.

William P. Smith is active whenever possible.

Chilmark (Martha's Vineyard): George D. Eustis has a station of great interest, with Juncos and Song Sparrows the predominating species.

Cohasset: A town that has made ornithological history.

Laurence B. Fletcher's well-known station is here, where the first banding in a systematic way was begun in the region included in the area of the Northeastern Association. Among



OUTLINE MAP OF NEW ENGLAND
DOTS SHOW LOCATIONS OF BANDING STATIONS

the hundreds of birds banded each year interesting captures have been made of groups of Juncos and White-throated Sparrows.

Richard B. and Katharine Harding have a most active and remarkably situated station. Among their records are the following that are of particular interest: two Wood Pewees, three Red-eyed Vireos, nine Oven-birds, six Chestnut-sided Warblers, and one Saw-whet Owl.

Charles L. and Helen G. Whittle's activities while they were operating their station were principally with Catbirds, Purple Finches, and Goldfinches, and their excellent studies of these species do not need to be commented upon.

Dr. John B. May has been active when possible, taking Chickadees, several Screech Owls, and one Barred Owl.

Cuttyhunk: H. S. Turner is the State Superintendent at this reservation and has banded many Laughing Gulls and Common and Roseate Terns. During the winter many Black Ducks and Canada Geese remain in the open water on the island and are banded, and the Commonwealth is coöperating with the Northeastern Association in this work.

Danvers: Charles H. Preston and Willis H. Ropes are both banding, but are not able to be as active as they were.

Dennis: Miss J. Olivia Crowell is a fine collaborator, trapping chiefly Song Sparrows.

Dover: Mrs. Louisa H. Emmons was an early active bander who took many birds of interest, especially Downy and Hairy Woodpeckers, Juncos, and Goldfinches.

Eastham: Oliver L. Austin, Jr., and Joseph Dallavalle have banded many species of both land and water birds. They made a fine study of the Common, Roseate, and Arctic Terns that nest on Cape Cod and banded the first Blue Grosbeak, Ipswich Sparrow, and Pectoral Sandpiper, as well as the first Canvas-back, American Eider, Lesser Scaup, and Old Squaw Ducks banded by members of this Association. Mr. Dallavalle is operating the station at the present time, and Dr. Oliver L. Austin has established a permanent sanctuary and banding station here to continue the studies begun by his son.

Edgartown: Mrs. A. W. Coffin operates a summer station.

Groton: William P. Wharton bands hundred of birds at this his home station, and as many more in winter at Summerville, South Carolina. The predominating species here are White-throated, Chipping, Song, and Savannah Sparrows, and Juncos. He has taken twelve Golden-crowned and nine Ruby-crowned Kinglets, eight Blackpoll Warblers, and one female Dickcissel.

Hardwick: Miss Dorothy A. Baldwin is a new operator.

Huntington: Albert A. Cross, who might well be called "the hawk-bander," has handled Duck, Broad-winged, Sparrow, Red-tailed, and Red-shouldered Hawks. Some of his interesting records are:

Duck Hawk banded in the nest early in 1925. Shot near Orange, New Jersey, September, 1925.

Red-tailed Hawk banded May 22, 1926. Shot at Brandywine Summit, Pennsylvania,[1] November 12, 1927.

Sparrow Hawk banded June 25, 1927. Found dead at Newport News, Virginia, December 6, 1927.

Sparrow Hawk banded June 21, 1925. Caught in a trap at New Market, Pennsylvania, March 19, 1927.

Duck Hawk banded June 23, 1928. Killed at Northumberland, Pennsylvania, October 20, 1928.

Don V. Messer is an active bander of Hawks and Sapsuckers.

Harry E. Woods might well have the title of "Phœbe-bander" for in 1925 he handled one hundred and ten Phœbes. He and Albert Cross banded the only Pileated Woodpecker on our records. He has about his traps principally Juncos and Chickadees.

Lancaster: Herbert Parker maintains a banding station in connection with his fine aviary.

Lenox: Maurice Broun is warden at the Pleasant Valley Flower and Bird Sanctuary. He traps many Song and Tree Sparrows and has taken several Lincoln Sparrows.

Lynn: Mrs. Edward M. Barney is inactive at the present time because of poor health.

Middleboro and *Marion:* Mrs. Alice B. Pratt has a fine station where Purple Finches, Goldfinches, and Evening Grosbeaks are taken in numbers.

Muskeget: Mrs. John A. Gillespie and others have banded on this island during the summer, taking immature Laughing and Herring Gulls, Common and Roseate Terns, Brown Thrashers, and Chewinks.

Rock: A W. Higgins is a bander of ability who took up the work in the early days of the movement in this country.

Sandwich: Mrs. George E. Burbank, beginning with the banding of Song Sparrows in March, 1922, has banded continuously since that time. The first year for returns, 1923, she took twenty-one. Among the rarer birds banded she has the only records in our association for the American Coot, the Clapper Rail, and the Florida Gallinule.

South Hadley: L. B. Smith now operates the former station of Professor F. A. Saunders. An interesting record of his is a Purple Finch banded here on March 6, 1928, which was killed in North Carolina on December 15, 1928.

[1]Since Hawks are hunted in Pennsylvania as an established and not as an incidental sport, many meet their death there.

Topsfield: Mrs. Elsie V. Perkins is well known for her work with Evening Grosbeaks.

Vineyard Haven: Allan Keniston, Superintendent of the Heath Hen Reservation, situated on the island of Marthas Vineyard, has been active with the native birds, since the formation of the Northeastern Association and in particular he has handled an unusual number of Towhees. He has banded Herring and Laughing Gulls on Muskeget and outlying islands, also Common and Roseate Terns.

Miss Grace C. Meleney bands here during the summer vacation, handling both land and water birds.

Waltham: Mrs. Alice B. Harrington is banding when possible.

Wareham: Walter B. Savery is active during the summer and in the winter operates a station in Texas.

Wayland: A. C. K. Hallock has recently begun the operation of a station, banding numbers of Purple Finches and Song Sparrows, and has taken photographs of birds worthy of mention.

Wellesley: Mrs. Horace C. Dunham has one of the very few active stations operated on the second story of a house. The traps are placed on window-shelves. Since she began in March, 1926, over eleven hundred birds have been banded. In 1928-29 she banded seventeen species, including ninety-five Goldfinches, one hundred and six Purple Finches, fifty-three Pine Siskins, forty-eight Juncos, seventy-seven Tree Sparrows (see note in this number of *Bird-Banding* regarding this species), and twenty-seven Rose-breasted Grosbecks. It is thus demonstrated that ground-feeding birds will patronize a second-story feeding-shelf.

Lester W. Smith is operating at the Stone Bird Sanctuary of Roger W. Babson, where he is the resident superintendent. He has a wonderful opportunity to band literally thousands of birds if he could give the necessary time to the work.

C. A. Barry is a new bander.

Westfield: Miss Antonie Borek has taken charge of the active station formerly operated by Dr. Chadwick at the State Sanitarium. Many tubercular children there have become interested in birds through observing Miss Borek handle them. One boy watches and operates a pull-string trap from his bed. He became so interested that his father purchased a camera for him and he has secured some worthwhile photographs. Catbirds, Chipping Sparrows, and Robins are taken in numbers, and ten Pine Warblers have been banded.

Mrs. Annie S. Wilder is active and is handling birds in numbers. She took sixty-eight Tree Sparrow returns during the winter season of 1929-30, which was more than the number of new Tree Sparrows banded during the same season.

Mrs. Sadie B. Knox maintains a successful station, banding principally Tree and Song Sparrows. She banded one hundred and thirty Tree Sparrows in 1926 between January 29th and April 28th.

Weepecket Island: Mrs. Prince T. Crowell, of Franklin, Massachusetts, has banded many Common and Roseate Terns on this island.

Whitinsville: Rev. George E. Allen handles White-throated Sparrows in numbers and participated in the banding of Black-crowned Night Herons, at Barnstable Masschusetts.

Worcester: Mrs. L. C. Hamill has an active station, banding Juncos in numbers.

Mrs. Kenneth Wetherbee, in addition to the commoner species, which she takes in numbers, has taken three Louisiana Water-Thrushes.

CONNECTICUT

Hartford: Mrs. Lucy S. Chapin, a former president of the Hartford Bird Study Club, has handled many Purple Finches, numerous Pine Siskins, and one American Crossbill.

Miss Lucy O. Hunt, President of the Hartford Bird Study Club, has Purple Finches as the predominating bird about her traps.

Mrs. H. J. Pratt has taken Fox and Field Sparrows in numbers, with one Prairie Horned Lark.

New Fairfield: Mrs. A. G. Mathers is a successful bander, formerly banding in Middleboro, Massachusetts.

New Haven: Mrs. Frank D. Hubbard ranks as a successful bander. Numbers of Purple Finches and White-throated Sparrows come to her station, where the first open-top trap for Warblers was used: A Bronzed Grackle, banded December 28, 1928, was shot in Gaspé County, Quebec, October 7, 1929, at almost the extreme limit of its breeding-range. She has banded one Short-billed Marsh Wren, one Grey-cheeked Thrush, and two Cape May Warblers.

Miss Cora M. Teot is also a very active and particularly successful bander with Juncos, Purple Finches, and Song Sparrows. Her list of rare captures include one Yellow Palm Warbler, one Orange-crowned Warbler, seven Golden-crowned Kinglets, one Ruby-crowned Kinglet and one each Wilson and Canada Warblers.

Norwich: Dr. Edward S. Rowland is a constant and active member. He formerly operated a station at Belchertown, Massachusetts.

MAINE

Bangor: Miss Bertha L. Brown is one of the most experienced banders in point of service.

Kittery: Prof. F. A. Saunders's summer station is here. Several species of warblers were taken by him in a water trap. Two Yellow Warblers, three Chestnut-sided Warblers and one Black and White Warbler, twelve Redstarts, and one Indigo Bunting. The following year he took as returns two Redstarts one Indigo Bunting, and one Yellow-Warbler.

Patten and *Northern Maine:* E. O. Grant, a forester, is an active bander. In 1925 he specialized on Chimney Swifts and banded nine hundred and ninety-nine, with seventy-one Redpolls, as well as many local birds.

Southwest Harbor: Mrs. Morris Morgan is an early bander whose accomplishments in banding Ruby-throated Hummingbirds on a shelf from the window of a summer hotel are well known.

F. J. Lurvey bands in summer.

NEW HAMPSHIRE

Antrim: Mrs. Rachel E. Coughey is fortunate in her location. Many Juncos, Chickadees, Song and Tree Sparrows, Purple Finches, and one Red-headed Woodpecker wear her bands.

Belmont: Carl W. Buchheister has a boys' camp during the summer with an active station. Last year he captured five Green Herons. His winter station is at Howlett, Long Island, where during October and December of last year he banded one hundred and fifty-six White-throated Sparrows.

Concord: Francis Beach White is an active and enthusiastic worker.

Exeter: Henry S. Shaw has a station here but is not active at present.

Greenland: The Sarah A. McCarthy Bird Sanctuary is located here and in summer a station is operated by Prof. Daniel A. Shea of Washington, D. C. Many Purple Finches, Song Sparrows, and Tree Sparrows are taken.

Hanover: Prof. R. R. Marsden traps a wide variety of species, particularly warblers. His records show the following: eleven Canada Warblers, six Redstarts, and Myrtle,

Black and White, Blackburnian, Black-throated Blue, Yellow, Pine, Magnolia, and Black-throated Green Warblers in some numbers.

Mrs. R. D. Kilbourne also maintains a fine station.

Holderness: Mrs. Katharine B. Harding has her summer activities here, where she made her fine studies of the nesting of Black-throated Blue Warblers.

Milford: James P. Melzer has an excellent opportunity to work with Purple Finches, Goldfinches, Tree Sparrows, and Chickadees. During March, April, and May, 1928, he banded between two hundred and fifty and three hundred Purple Finches.

Peterboro: Mr. and Mrs. Charles L. Whittle each operate a fine station which has produced excellent results. They have made special studies of the plumages of Purple Finches and Goldfinches, and the mating of Chipping Sparrows and White-breasted Nuthatches.

Sanbornton: E. C. Weeks has had notable results with Juncos, Chipping Sparrows, and Song Sparrows. Fifty-one White-crowned Sparrows were banded during the spring and fall of 1929.

RHODE ISLAND

Charlestown (Audubon Bird Sanctuary): Mr. and Mrs. Everett Southwick are in process of organizing a station.

VERMONT

Burlington: Dr. Harry C. Fortner is taking numbers of White-throated and Song Sparrows. He banded seventy-six White-crowned Sparrows during May of last year, with six Crested Flycatchers. He is to be absent for a year.

Rutland: Leslie Crane is active through the entire year.

Wells River: Wendell P. Smith is doing splendid work with Chickadees, Song Sparrows, Tree Sparrows and Juncos. He banded the first Hoary Redpolls and White-winged Crossbills banded in New England.

CANADA

Wolfville, Nova Scotia: Robie W. Tufts has five young men working under his leadership, trapping many Robins, Tree, Song, and Chipping Sparrows, and Bank and Barn Swallows. Twenty-seven Yellow Warblers wear his bands.

Ottawa: Harrison F. Lewis has done wonderful banding

work in the large sea-bird colonies under his care. (See his article in this number.)

LABRADOR

Commander Donald B. McMillan banded Razor-billed Auks' Brünnich's Murres, Black-backed, Herring, and Glaucous Gulls, and Northern Ravens last year, and on his Arctic trips he devotes what time he can to this work.

Auburndale, Massachusetts, May, 1930.

SOME PURPLE FINCH NOTES, PRINCIPALLY ON THE MOULT OF THE PRIMARIES AND SECONDARIES

By M. J. MAGEE

IN some respects this year (1929) has been an unusual one so far as Purple Finches are concerned. They came in numbers the earliest and left the earliest of any year since I started putting out food regularly in 1915. Large flocks were seen around town March 1st, and I trapped the first one for this year March 6th. The last one trapped was October 17th, and there were only a few around then. I left that afternoon to attend the annual meeting of the A. O. U. in Philadelphia. On my return I was told the last Purple Finch seen at my feeding station was October 21st.

From March 6 to May 1, 1929, 924 were trapped. Last year the first one trapped was on May 1st and there were quite a few still around the middle of November; the last one banded for that year was on December 4th. On account of the early start this year, 1960 Purple Finches were banded and there were 181 returns, making 2141 individual birds trapped.

This year I have attempted to make a partial check on their moult. From July 1st, the date on which I noticed the first signs of moult, to October 17th, when the last Purple Finch for the year was trapped, I looked over 675 birds. As I could not spend all my time on the work, I confined my efforts largely to the moult of the primaries and secondaries.

THE MOULT FROM JUVENAL INTO FIRST WINTER PLUMAGE

One hundred and fifty-one young-of-the-year were looked over. There were probably more banded, for after moulting I doubt if the young-of-the-year can be positively separated from the adult females. I noticed the first signs of the moult-

ing of a young bird July 31st, but the majority did not show to the eye signs of moulting until about August 15th. The last young bird showing moult was taken October 1st, but most were apparently through moulting from a week to ten days earlier. I found nothing to indicate that any of the young-of-the-year moulted their primaries, secondaries, or tail feathers. I would place the length of time for the moult from Juvenal to First Winter plumage at from five to six weeks.

THE ADULT MOULT

Adult Purple Finches, including 1928 males, start moulting much earlier than the young. This year I saw the first adult indicating moult on July 1st, and by July 15th the moult had started on the great majority looked over. The first visual signs of moulting are loose body feathers and new feathers coming on the forehead and sometimes on the crown as well.

Dr. Dwight states: "Whenever a complete moult is about to take place the first tract to show activity is usually the alar (wing) tracts and the fall of the innermost primary is the starting signal closely followed by the feathers of the breast. . . . Very shortly new feathers appear among the interscapularies, the scapularies and the greater wing coverts, and usually a little later the feathers of the forehead. . . ." The foregoing may be correct for the large majority of passerine birds, but certainly it does not hold good for Purple Finches.

I checked over fifty adults showing moult on forehead before I got one that had lost a primary. The following are a few examples:

Adult female.	July 8, moulting crown and forehead.
	Aug. 6, 5th primary $\frac{7}{8}$ grown; 4th $\frac{1}{2}$; 9th just showing.
A 1928 female.	July 12, moulting forehead.
	Sept. 23, 1st primary $\frac{7}{8}$ grown; 3rd secondary $\frac{1}{2}$ grown.
A 1928 male.	July 13, moulting crown and forehead.
	July 31, 8th primary a little over $\frac{1}{2}$ grown and 7th about $\frac{1}{2}$ grown.
Adult female.	July 15, moulting crown and forehead.
	Aug. 3, 8th and 7th primaries about grown; 6th $\frac{3}{4}$; 5th $\frac{1}{2}$.
Adult male.	July 16, moulting crown and forehead. No moulting of primaries as yet.
Ault male.	Aug. 1, moulting body and head feathers. No moulting of primaries as yet.

Two hundred and seventy-nine Purple Finches were checked for the moulting of primaries and secondaries. The Purple Finch has nine primaries. From the 8th to the 1st, they are renewed nearly always in regular order—8th, 7th, 6th, etc. The secondaries, six in number, are renewed nearly always in

regular order—1st, 2nd, 3rd, etc. Now and then two or three, in one case four, adjacent feathers were of just about the same length, but in only two cases did I find a lower-numbered primary longer than a higher-numbered, excluding the 9th, and only one case in which a lower-numbered secondary had not been renewed first. The three exceptions were:

A 1924 male.	Aug. 13, 8th primary $^{2}_{3}$ grown; 7th about grown; 6th $^{7}_{8}$; 5th $^{1}_{2}$; 4th $^{1}_{3}$.
Adult male.	Aug. 19, 8th primary $^{3}_{4}$ grown; 7th $^{7}_{8}$.
Adult female.	Oct. 8, 1st secondary $^{1}_{8}$ grown; 5th and 6th $^{3}_{4}$.

The 9th, innermost, primary I found quite erratic in its moult. It apparently is an exception to the rule that the innermost primary is the first to moult. The 9th primary was checked on twenty-four birds. Below is the list to show the irregularity:

A 1928 male.	July 21, 9th primary $^{1}_{2}$ grown; 8th a little shorter.
Adult female.	July 21, 9th and 8th primaries just showing.
Adult male.	July 28, 9th and 8th primaries just showing.
A 1927 female.	July 29, 8th and 7th primaries just showing.
	Aug. 31, 9th primary $^{7}_{8}$ grown; 4th $^{3}_{4}$; 3rd just showing.
A 1926 male.	July 30, 9th and 8th primaries just showing.
A 1928 male.	Aug. 4, 8th to 5th primaries, about grown; 4th just showing.
	Aug. 13, 9th primary $^{1}_{3}$ grown; 2nd $^{1}_{2}$.
Adult female.	Aug. 4, 8th and 7th primaries nearly grown; 6th $^{3}_{4}$; 5th just showing.
	Aug. 13, 5th primary $^{1}_{2}$ grown, 4th just showing.
	Aug. 23, 9th primary just showing; 4th $^{7}_{8}$; 3rd $^{2}_{3}$; 2nd $^{1}_{3}$.
A 1928 male.	Aug. 4, 9th, 8th, and 7th about grown; 6th $^{2}_{3}$; 5th $^{1}_{8}$.
Adult female.	Aug. 5, 9th primary $^{1}_{2}$ grown; 8th just showing.
A 1928 male.	Aug. 5, 9th primary $^{2}_{3}$ grown; 8th $^{1}_{3}$; 7th just showing.
A 1928 male.	Aug. 5, 9th and 8th primaries just showing.
Adult female.	Aug. 6, 9th primary just showing; 5th $^{7}_{8}$; 4th $^{1}_{2}$.
	Aug. 13, 9th primary $^{1}_{3}$; 4th $^{2}_{3}$.
Adult female.	Aug. 6, 9th primary $^{1}_{3}$ grown; 5th $^{2}_{3}$; 4th $^{1}_{2}$.
Adult female.	Aug. 7, 9th primary just showing; 5th $^{3}_{4}$; 4th $^{1}_{2}$.
A 1928 male.	Aug. 7, 9th primary $^{2}_{3}$ grown.
A 1928 male.	Aug. 11, 9th primary just showing; 4th $^{2}_{3}$.
A 1928 male.	Aug. 11, 9th primary $^{3}_{4}$ grown; 8th $^{1}_{2}$; 7th $^{1}_{4}$.
A 1928 male.	Aug. 11, 9th primary $^{1}_{2}$ grown; 8th $^{1}_{3}$.
A 1928 male.	Aug. 12, 9th primary $^{1}_{4}$ grown; 4th $^{1}_{2}$.
	Aug. 15, 9th primary $^{1}_{2}$ grown; 4th $^{7}_{8}$.
A 1928 male.	Aug. 12, 5th primary $^{1}_{2}$ grown; 4th just showing.
	Aug. 23, 9th primary $^{1}_{3}$ grown.
A 1928 male.	Aug. 21, 9th primary $^{1}_{2}$ grown; 3rd $^{7}_{8}$.
Adult female.	Aug. 23, 9th and 8th primaries $^{1}_{2}$ grown.
Adult female.	Sept. 8, 9th primary $^{7}_{8}$ gown; 1st secondary $^{1}_{3}$.
Adult male.	Sept. 11, 9th primary $^{3}_{4}$ grown; 3rd nearly grown.

Of the above, half were moulting the 9th primary about as you would expect; the other half were moulted later and irregularly.

Sixty birds were checked in various stages of moult of the 8th primary in which the 9th primary was a fully grown feather. In thirty of these the 8th primary was over half grown and possibly a new 9th primary might have obtained full growth previous to my trapping the bird. This would hardly hold for the thirty birds checked with the 8th primary just showing to half grown. The majority of these birds must have moulted the 9th primary later.

For the year the check-up indicates about one half of adult Purple Finches, regardless of age or sex, moult the 9th primary regularly; the other half, irregularly.

Next year I hope to make a further check, and, if it confirms this year's, that should settle the matter.

The 1st secondary is not moulted until the primaries are well along in their moult. My earliest date for a new 1st secondary showing is August 4th, and in no case did I find the inner, 6th, secondary, fully grown until after the first primary had attained its growth. The length of time for the adult moult I should put at from about twelve to fourteen weeks. The following are just a few records from my list, indicating the length of time of moult:

Adult female.	July	7, moulting forehead, loose feathers, rump, and upper tail-coverts.
	Sept.	19, 1st primary $\frac{1}{4}$ grown; 3rd secondary $\frac{1}{2}$; 4th $\frac{1}{4}$.
A 1928 male.	July	12, moulting forehead.
	Sept.	23, 1st primary $\frac{7}{8}$ grown; 3rd secondary $\frac{1}{2}$.
Adult female.	July	17, moulting forehead.
	Oct.	12, 5th secondary $\frac{3}{4}$ grown; 6th $\frac{1}{2}$.
A 1928 male.	July	21, 8th primary $\frac{7}{8}$ grown; 7th $\frac{3}{4}$; 6th $\frac{1}{2}$.
	Oct.	12, 1st primary $\frac{1}{2}$ grown; 3rd secondary $\frac{2}{3}$; 4th $\frac{1}{3}$.
A 1928 male.	Aug.	1, moulting greater coverts.
	Oct.	8, 6th secondary $\frac{1}{2}$ grown.

The first female apparently through moulting was a 1927 bird trapped September 16th, and the first adult male apparently through moulting was trapped September 25th.

Sault Ste. Marie, Michigan, December 1, 1929

GENERAL NOTES

Spring Arrivals of Song Sparrows in 1930—During a period of cold weather from January 19 to 29, 1930, I banded six Song Sparrows by our house in Columbus, Ohio; one was never seen again, another stayed in the vicinity till February 18th, while the other four are nesting here, 70, 100, 230, and 240 yards respectively from the trapping station. Definite dates of arrivals of nesting males in 1930 (not of trapping, but when they actually came) were February 23 (bird banded in 1928, arriving March 9, 1929), February 25 (banded February 19, 1929), February 26, March 4, March 15.

The majority of territories this year were taken up in February, eleven birds appearing between the 5th and 26th. One three-year-old male wintered, extending his range over about three times the area he does in the nesting-season; from February 13th he confined himself to his own and his next neighbor's territories, on the same date beginning to sing in earnest. Censuses of the fifty or so acres of low land between West Lane Ave. and Doddridge St., east of the Olentangy River, from March 1st to 6th revealed 64 males, mostly unmated. When *Melospiza melodia melodia* first takes up his territory he sings more than at any other time of year, often two hundred to three hundred times an hour, but after he has been joined by a mate his singing ceases almost entirely and, it is not revived until nesting begins. It reaches its second maximum while his mate is incubating and declines again after the young are hatched. Censuses from April 2d to 6th showed that all but four of these males were mated; by April 16th the last pair was complete. Dates of arrivals of individual females were March 11, 14, 15, 21 in 1929, and February 21, 22, March 1, 10, 15, April 8, 16 in 1930.

As to banded birds, the three adult males (counting the resident bird) and one of the two adult females returned, also one of eleven young. This bird is nesting two hundred and twenty yards west of her birthplace. Her mother arrived on March 15th both years; this season her place had been preempted by an earlier comer, and she settled seventy-five yards to the west. All three banded males have different mates from last year, one of them having had a different one each of the three years of his residence next us.

In 1929 nesting started about ten days earlier than this year, for the first set—but for an accident—should have been complete April 13th, while in 1930 the earliest of eight sets was not complete until April 23d. Last year February was 4.5 degrees colder than normal, March was 8.3 degrees warmer than normal and April was 3.2 degrees warmer. This year February was 9.5 degrees warmer than normal, March was 0.5 colder, and April 3.0 degrees warmer. Perhaps the warm weather in February, 1930, hastened the taking up of territories, while that of March, 1929, may have been resonsible for the early nesting.

I am now attempting to band as many nesting Song Sparrows as I can, and this necessitates taking the trap to each territory. The colored celluloid bands invented by Dr. W. K. Butts of Millikin University, Decatur, Illinois, have been invaluable to me in marking these birds so that they can be distinguished in the field.—MARGARET M. NICE, Columbus, Ohio.

Complete Record of a Wintering Lincoln's Sparrow[1]—A Lincoln's Sparrow (*Melospiza lincolnii*), No. A115294, which was banded November 24, 1928, in Norristown, Pennsylvania, remained during the entire winter, as shown by the following complete record of its captures:

[1] A partial record was reported in *Bulletin* of Northeastern Bird-Banding Association, Vol. V, No. 2, page 63.

November 24, 27; December 9, 10, 13, 21, 1928; January 2, 27; February 2,4,16,21,23 (4 times), 24 (2 times), 25; March 21, 27; April 3, 19, 1929. It was not seen after its last capture.—RAYMOND J. MIDDLETON Norristown, Pennsylvania.

A Sparrow Hawk Recovery—On November 25, 1929, I was surprised to find in my sparrow trap a male Sparrow Hawk bearing a band numbered 10833. The Hawk had killed a Tree Sparrow, but apparently had left untouched three other birds which were in the trap with him—one Song, one Tree, and one White-throated Sparrow. Perhaps the bird was so alarmed at finding itself trapped that it lost interest in food. This Sparrow Hawk had been banded by Lester W. Smith at Babson Park, Massachusetts, on June 14, 1929. It was one of four nestlings, all of which, together with one of the parents, were banded by Mr. Smith. The Hawk was released after examination and photographing.—WILLIAM P. WHARTON, Groton, Massachusetts.

Two White-throated Sparrow Recoveries—R. P. Marsden of Hanover, New Hampshire, reports that White-throated Sparrow A140119 banded by him in Hanover, April 30, 1929, was killed in Tabor, Columbus County, North Carolina, December 24, 1929.

Miss Cora M. Teot writes that a bird of this species banded by her in New Haven, Connecticut, April 24, 1929, was found dead in Florence, Florence County, South Carolina, by S. C. Edens, January 30, 1930.

Tabor and Florence are both situated on the coastal plain and are approximately fifty miles apart. Tabor is thirty miles from the ocean, and Florence is about seventy miles from the Atlantic. These regions to our personal knowledge abound with wintering White-throated Sparrows. The above recovered birds probably kept fairly near the coast during their migration southwesterly.—C. L. W.

House Wren Returns—Of three House Wrens (*Troglodytes a. aëdon*) returning in 1929 only one was breeding on our place in 1928, No. 13914. Of the other two No. 7594 returned on May 4th and was later, on June 16th, found breeding in one of the boxes. This bird was banded May 2, 1928, on the first day that House Wrens appeared here that spring, and returned September 21, 1928.

All birds breeding in our boxes in 1928 were banded, and in early September Wrens were very scarce here, but in the third week of the month we began trapping quite a number of them, all new birds, and they were also very much in evidence around our traps. While this flight was passing through, No. 7594 was captured, a return—1. On the same day, September 21, 1928, No. B13935 was banded, and on May 10, 1929, it was found nesting in one of our boxes.

Here is a case of two birds both of which were migrants at this place in 1928, but during 1929 were breeding here.[1]

We had a very interesting situation when the young House Wrens of the first broods left the boxes. When the second broods were started, we found that several pairs had changed mates, and the following chart will show the changes, and from the dates given the reader may note the time elapsed from when the young left the boxes and when the set of eggs were completed for the second broods:

[1]These two Wrens, transients at the banding station, were very likely summer residents for the general region. It might be advantageous to recognize tentatively 'local transients' as opposed to 'through transients', the validity of these groups to be checked by further studies.—J. T. N.

Box No. 1	♂ 7594 ♀ B70523	6 young left the box June 16th.	Box No. 4	♂ B13914 ♀ B70523	6 eggs in nest on June 26th.
Box No. 2	♂ B13914 ♀ B74504	5 young left the box June 20th.	Box No. 5	♂ B74517 ♀ B74504	6 eggs in nest on July 8th.
Box No. 3	♂ B74517 ♀ B70524	3 young left the box July 1st.	Box No. 6	♂ Not banded ♀ B70524	6 eggs in nest on July 14th.

On June 25th No. 7594 was captured in a box near Box No. 1 with a nest of coarse sticks. His mate having deserted him, he had set up bachelor quarters. A Wren was seen by this box for several days afterwards. No. 7594 was not taken later.—RAYMOND J. MIDDLETON, Norristown, Pennsylvania.

Interesting History of two White-breasted Nuthatches—A mated pair of banded White-breasted Nuthatches has raised a brood for two consecutive nesting-seasons, and probably longer, near my station in Hingham, Massachusetts. As these birds were also present at my station during the major part of the two intervening winters, they are doubtless permanent residents. The details are: The male was banded March 30, 1927, with band No. 80057, and the female was banded with band No. B10901, March 30, 1928. During 1928 one brood was raised, the male bird on one occasion about the middle of June coming to the station with four young, which afterwards came several times, and then disappeared. The second brood was raised in 1929. During the last winter, 1929-30, they were not so much in evidence, although they were trapped on February 23d.

On account of certain habits possessed by the female, I feel sure that the mate of 80057 in 1927 was the same bird banded in 1928, although I cannot prove this to be the case.—REGINALD A. OSBORN, Hingham, Massachusetts.

A Mourning Dove Recovery—On July 2, 1929, a young Mourning Dove (*Zenaidura macroura carolinensis*) fell out of the nest when about half grown and was picked up and banded No. A404971. It was seen near the nest tree either running on the ground or flying a few feet for ten days afterwards, and when last seen was able to fly thirty or forty feet. On October 8, 1929, it was captured in Henderson, Virginia.[1]—RAYMOND J. MIDDLETON, Norristown, Pennsylvania.

Wood Thrush Returns S.—Mrs. F. D. Hubbard of New Haven, Connecticut, writes that in 1923 she banded ten Wood Thrushes. Of these 1923 birds, one, banded May 20th, returned May 22, 1924. A second one, banded on the same date, returned May 19, 1924. A third one, banded July 9, 1923, was killed by a cat about a half-mile from her station, June 6, 1924. It is interesting to note that three Wood Thrushes out of ten banded (30 per cent), two of which, at least, were adults, returned to Mrs. Hubbard's station or to a point close by the following year after banding.—C. L. W.

A Five-Year-Old Downy Woodpecker. Mr. John G. Wolf, of Loomis School, Windsor, Connecticut, sends us word of a Downy Woodpecker banded November 21, 1924, and reported through the Biological Survey as found dead at Windsor by D. Howard, December 26, 1929. This is one year more than the record given for this species in the October, 1928, *Bulletin*, p. 142.—J. T. N.

[1]Comparable to a nestling Dove banded on Long Island, New York, in July, killed in Georgia the following December. See *Bird-Lore*, 1924, p. 120. J. T. N.

A Migrating White-throated Sparrow Return—A White-throated Sparrow (*Zonotrichia albicollis*), No. A115136, banded October 26, 1928, returned October 10, 1929. During the winter of 1928–29 there were for the first time several of these birds wintering here, but this bird was not trapped at any time during that period, and there are no birds remaining this winter (1929–30). The above facts and the date of its return would, in my estimation, justify its classification as a migrating return. Nearly all of the White-throated Sparrows banded in the fall of 1929 were immature birds. Only seventy-five out of three hundred and thirty-nine were adults. The first flight appeared on September 22d and continued until late in October. The first adults in any numbers came through on October 10th, the day the return was taken. From then until the 19th nearly all of the adults were taken. The late September, 1929, flights were in much greater numbers than in 1928, but in 1928 they were still passing through in numbers, until the middle of November. In 1928 the flights came in great waves, spaced mostly about a week apart, but in 1929 they seemed to come more in a steady movement. While on some days there were many more than others, we did not have the tremendous variations of 1928.—Raymond J. Middleton, Norristown, Pennsylvania.

Tree Sparrow Returns–W During the Season of 1929-1930—Whenever even the partial history of a known number of birds is available, it seems worth while to place the facts on record. During the winter season of 1929–30 Elizabeth M. Dunham took at her banding station in Wellesley, Massachusetts, twenty Tree Sparrows (*Spizella m. monticola*), banded during three previous wintering seasons beginning in March, 1926. The totals banded by seasons were:

1926	54
1926–1927	39
1927–1928	45
1928–1929	46
1929–1930	28

The complete known history of the birds banded in 1926, 54 in number, is as follows: During the next wintering season, 1926–27, ten Tree Sparrows were recaptured as returns–1, 18.50 per cent. Of these ten returns–1, five were returns–2 during the season of 1927–28 or of 1928–29, or 50 per cent of the returns–1, and three were returns–3 in 1929–30, or 60 per cent of the returns–2, one of them being taken March 31, 1930, and another on April 1, 1930, at which time they were at least five years old lacking a month or two. The returns–3 also show that 5.555 per cent of the original 54 Tree Sparrows lived to be close to five years old.

Of the 20 returning Tree Sparrows in 1929–30, twelve were returns–1 banded during the season of 1928–29, or 26.08 per cent of the 46 banded that season.—C. L. W.

A Northern Shrike Repeat—On December 20, 1929, I banded a Northern Shrike. I saw no Shrikes after that date until February 27th, when a bird was noticed near my home at Speonk, Long Island. As I had none in my collection, I collected the bird, and it proved to be the one that that I banded on December 20th. This may have a bearing on the winter wanderings of Shrikes after they reach our latitude. In this case the bird wandered far enough to carry the bird beyond notice for two months, but not so far but that it returned later in the winter.—LeRoy Wilcox.

A Change in Nesting-Habits of the Wood Pewee—In 1924 the Wood Pewees (*Myiochanes virens*) near our camp at Holderness, New Hampshire, built their nests in the oak trees—frequently fifty feet from the ground. During the next two years gypsy moths stripped the oaks just about the time the young Wood Pewees hatched. Whether the fledglings perished from the exposure to sun and rain or were the victims of crows or hawks, I do not know, owing to the height of the nests, but it seems likely that many losses occurred.

Since that time the Wood Pewees in the vicinity appear to have changed their nesting-habits in order to overcome the difficulties which they had encountered. For the past three seasons they have built their nests chiefly in beech or maple saplings (the leaves of which are not eaten by gypsy moths) at a height of from twenty to thirty-five feet. Now the young are available for banding, and in 1929 I found three nests at the apices of a triangle about fifty feet on a side, but I banded only one brood, as the other saplings were too slender to climb or to support a ladder. It seems as if this adaptation of nesting-habits to meet new conditions brought about by the devastating gypsy moths had resulted in the Wood Pewees once more raising their young successfully, under favorable circumstances. —Katharine C. Harding, 121 University Road, Brookline, Massachusetts.

Slate-colored Junco Recovery—On April 3, 1929, a Slate-colored Junco (*Junco h. hyemalis*) was banded, No. A122929, and on April 8, 1929, was trapped by H. O. Havemeyer at Mahwah in northern New Jersey. When banded, this bird's lower mandible was slit in two parts (an old cut and healed up), one part curved to one side and the other part curved the other way. It seems hardly possible that this bird could pick up any fine seeds unless by use of its tongue.—Raymond J. Middleton, Norristown, Pennslyvania.

A Song Sparrow Return 3 S.—James R. McGreal, of Manchester, New Hampshire, reports a Song Sparrow's return for three successive years. Banded March 31, 1927, it returned March 28, 1928, May 25, 1929, and March 28, 1930. This bird was at least four years old when last handled. As the bird repeated up to May 21, 1927, May 13, 1928, once in July, 1929, and on May 13, 1930, it undoubtedly was a bird nesting near the banding station.—C. L. W.

An Unusual Duck Hawk Recovery—On June 16, 1929, my brother and I discovered a Duck Hawk's nesting ledge near Lake Mohonk, New York. The nest was fairly easy to reach and contained two young hawks and a sterile egg. The bodies of the birds were still covered with white natal down, but brown feathers showed in wings and tail. One, presumably the female, was considerably larger than the other. A telegram to the Biological Survey brought bands thirty-six hours later, and on June 18th they were banded as *Falco peregrinus anatum*, the larger with No. A701031, the smaller with No. A701032. The young were last seen on the nesting-ledge July 1st. The four hawks were last seen together in the air near the nest on July 18th, although Duck Hawks were still in the vicinity on September 18th.

On September 26, 1929, No. A701032 (probably the male) was shot at Grand Islands, Nebraska, by a farmer, because it was "after" his chickens. This represents a post-nuptial wandering of twelve hundred air-miles in less than two months and a half.

Dr. John B. May comments on this recovery in "Items of Interest" for

February 6, 1930, to the effect that it does not agree with recoveries of New England Duck Hawks, which have all been retaken east of the Alleghanies, as far as he knows.

The Duck Hawks were responsible for another recovery. On the nesting-ledge were found two pigeon bands. Upon tracing them through the Biological Survey and then the American Racing Pigeon Union, we found that the bands had been on a young and promising racing pigeon which was in a five-hundred-mile race from Ashtabula, Ohio, to New Bedford, Massachusetts. It is a rather interesting coincidence that this pigeon coming from the West nourished the hawk which was very soon to find its last resting-place in the West.—ALBERT K. SMILEY, JR., DANIEL SMILEY, JR., Mohonk Lake, New York.

Evening Grosbeak, Robin, and Purple Finch Recoveries—Cards received this year, 1930, to May 20th from the Biological Survey announced fourteen recoveries of birds banded by me at Sault Ste. Marie, Michigan, as follows:

Evening Grosbeaks			
Adult male	Banded Apr. 16, 1925	Returned 1929 Found dead, Cohasset, Mass.	Apr. 10, 1930
Adult female	Banded Mar. 9, 1927	Returned 1928 Trapped, Sandwich, Mass.	Mar. 22, 1930
Adult male	Banded Nov. 23, 1927	Trapped, Vassar, Michigan	Apr. 3, 1930
Adult male	Banded Jan. 27, 1929	Found dead, Sault Ste. Marie, Ont.	Jan. 6, 1930
Adult male	Banded Mar. 16, 1929	Found dead, Conklin, N. Y.	Jan. 1, 1930
Adult female	Banded Mar. 16, 1929	Found dead, Boston, Mass.	Mar. 31, 1930
Adult male	Banded Apr. 3, 1929	Trapped, Vassar, Michigan	Feb. 9, 1930
Adult female	Banded May 16, 1929	Trapped, Topsfield, Mass.	Feb. 8, 1930
Robins			
Adult	Banded Aug. 31, 1927	Shot Dover, Florida	Feb. 26, 1930
Adult	Banded Sept. 4, 1929	Killed Lake Providence, La.	Jan. 22, 1930
Purple Finches			
Adult female	Banded May 8, 1923	Caught by a cat, Tatemagouche, Colchester Co., Nova Scotia	June 17, 1929
Adult female	Banded May 18, 1929	Captured Jeanerette, La.	Jan. 19, 1930
Adult	Banded May 25, 1929	Shot Abbeville, La.	Jan. 19, 1930
Adult	Banded July 14, 1929	Shot Giddings, Texas	Dec. 26, 1929

—M. J. MAGEE.

A Common Tern Recovery—A nestling Common Tern banded by me July 4, 1929, at Penikese Island was found dead near the Lower Amazon, Brazil, on May 24, 1930.—L. B. FLETCHER, Cohasset, Massachusetts.

Ten Thousand Purple Finches Banded at one Station—On May 10, 1930, I banded my 10,000th Purple Finch. Regarding this, I wrote the Biological Survey: "I am under the impression that for small non-game birds, this is the first to go beyond the 10,000 mark since banding was taken over by the Survey. Every bird was trapped." The Survey replied: "You are certainly correct in assuming that your record for 10,000 Purple Finches is the first of its kind for small non-game birds."—M. J. MAGEE.

Known History of Four Chipping Sparrow Nestlings.—On August 21, 1924, I banded four Chipping Sparrows in their nest at Cohasset, Massachusetts. One has not been retaken. Another was taken at Cohasset, April 29, 1925, and the third on August 6, 1925. The fourth was taken successively on May 8, 1925; May 9, 1926; May 11, 1927, and May 15, 1928. Thus of a brood of four birds, three returned the following year to the immediate vicinity of their birthplace, one of the three being captured the four following springs on dates varying but one week apart.—LAURENCE B. FLETCHER, Cohasset, Massachusetts.

SUGGESTIONS FOR COLLECTING EXTERNAL PARASITES OF BIRDS

HAROLD S. PETERS

U. S. Bureau of Entomology

Mallophaga, or biting lice, are commonly found on practically all species of wild birds. They are very small (generally from one twentiethtoone fourth inch in length), flattened, and are found near the base of the feathers and on the skin of the host, especially on the head, neck, breast, and back and under the wings. They feed on parts of the feathers and dead particles of the skin.

In bird-banding work with a little patience it is possible to collect these parasites from trapped birds. By carefully parting the feathers the lice can be picked from the bird with small forceps or tweezers. Small curved-nose forceps are most convenient to use. The lice should be placed immediately in a small vial of 70 per cent alcohol for killing and preserving. In collecting birds they can be examined for lice either immediately after shooting or just before the bird is skinned. Mallophaga have a tendency to crawl from the host as the body cools; consequently it is always best to wrap the birds individually in several thicknesses of paper until time is available for examination. Birds should not be thrown together in a gamebag until they have been examined, as an interchange of host may occur. It is very important to have the exact and correct host record. It is much easier to collect lice from a freshly killed bird than from a live one which is continually squirming and trying to escape from the hand.

Place parasites from only one individual bird in each vial of preservative. The vial should then be labelled with the correct host-name, locality, date, and name of collector. Frequently several species of Mallophaga will be found on one bird. Care must be taken to examine each bird very thoroughly to be sure none are overlooked. It is also well to preserve some of the immature lice and eggs if any are observed.

This same method of collecting and preserving will apply to the other groups of parasites found among the feathers or on the skin of the bird. Mites, ticks, fleas, and bird flies (*Hippoboscidæ*) may be found on many birds and should be collected and preserved in the same vial with the lice.

We are very anxious to secure parasites from birds from all parts of the United States and will gladly furnish small vials with 70 per cent alcohol to persons willing to coöperate in this work. I may be addressed at the Bureau of Entomology, Washington, D. C.

NOTICE TO COLLECTORS OF BIRD PARASITES

Word has been received that Harold S. Peters, who appealed to banders in the April *Bird-Banding* to collect parasites for the United States Bureau of Entomology and who renews his appeal in this issue, has left for the southern Bahama Islands to be absent about four months. He wishes banders to know that he cannot answer letters or determine specimens until his return in September. The Entomological Bureau, however, will handle any correspondence and send vials to those requesting them. It is hoped that a fine response by all banders will be made to his request for specimens.

RECENT LITERATURE

The Book of Bird Life.—By Arthur A. Allen, D. Van Nostrand Co., Inc., New York.

Dr. Allen might well have taken *multum in parvo* for his motto when preparing this excellent little book, for it contains a vast amount of suggestive information in small space. As he says in the Introduction, "The present volume can scarcely be called a manual; it does not attempt to discuss the detailed habits of a single species completely. Rather, it aims to outline the underlying principles that govern the actions of any bird and to suggest methods of study." In this aim it succeeds admirably.

Much of the material used has already appeared in the School Department of "Bird-Lore" but there is also much new matter. There are frequent references to bird-banding as a source of information on the habits of birds, and on pages 328–332 there is a brief account of banding as a method of bird study.

As might be expected in a book by Dr. Allen, the illustrations, mostly from his own photographs, add greatly to the popular value of this decidedly interesting volume.—J. B. M.

Der Vogelzug, 1, No. 2, April, 1930, pp. 65–104.

The second number of this, the German counterpart of *Bird-Banding*, is considerably smaller than the first, but contains eight papers as well as a good number of shorter notes and reviews of current literature.

O. Kleinschmidt, in a short article on some aspects of the future study of bird migration, suggests that inasmuch as banding stations are too thinly scattered throughout Germany, and probably never will be very much more numerous than now, school-children should be taught to record their observations of local birds, and that all these records should be handed in and kept on file where they would be available for reference. In his work on the geographic races of birds, Kleinschmidt has proposed the term "pantogram" for a complete picture of the variations of a subspecies in one area of its total range. He now proposes to extend this term to the study of migration, in which sense a pantogram would be a complete picture of the migration of a single species in one place in a single season. Then, when a sufficient number of such pantograms are available, it should be possible to construct a "geogram" for the whole range of that particular species. All this seems to be a rather unnecessarily elaborate way of saying that we need more exact data on the migration of every species, but the thing that he seems to have in mind is that a mere statement of geographic range is no longer adequate; we must also know how the individuals in any part of the range get to that particular area. Distribution is always temporary; the birds are here to-day and gone to-morrow, and before we can truly say we know the range of a species we must have some idea of the geographic position, at any one time, or at all times, of all the component groups of individuals which collectively comprise the species.

E. Schüz contributes some notes on the common Swift (*Apus apus*), his paper being a contribution from the famous station at Rossitten. He finds that as many as three sets of eggs may be laid by one bird in a season; that the birds are known to return to the same spot, in one case for as many as six consecutive years; that not infrequently the same birds are found paired together in successive years, although exceptions are not uncommon.

R. Drost has brought together some data on banded Crossbills (*Loxia c. curvirostris*) and finds that the majority of the birds that invaded Helgoland in 1927 and 1929 were young ones, although 22.8 per cent of the birds in the 1927 flight were adults, and in the 1929 invasion 21.3 per cent were adult birds. He also records the wing-lengths and weights of all the birds

banded (over one hundred fifty) and finds a slight positive correlation between the two sets of data. With regard to the dextral or sinistral crossing of the bill, he finds that the 1927 birds were evenly divided in this respect, while the 1929 flock contained two sinistral to every dextral individual.

E. Schüz contributes some notes on the migration of the Rook (*Corvus frugilegus*), and R. Drost similar observations on the Blackbird (*Turdus m. merula*). In the latter species, birds banded at Helgoland, have been recovered in various places in northern France and even in Spain on the one hand, and in southern Norway and in Latvia on the other. Drost finds that the breeding-grounds of the migrants that pass through Helgoland are chiefly in Denmark and southern Scandinavia. The main migration route in autumn is southwesterly, and the winter quarters extend as far as Spain. In Germany the species is only partly migratory and partly a permanent resident, but the migration route in that country is also southwesterly, and the winter quarters of the German breeding birds extend to Belgium, France, and Italy.

In another paper on the migration of the Wagtails of Germany (*Motacilla alba*, *M. cinerea*, and *M. flava*) Drost finds that all three follow a southwesterly path, and that German breeding specimens of *M. alba* go as far as Spain in winter.

Schüz continues and concludes his report on the observations made by a chain of coöperating observers near Rossitten, and Dobbrick has a paper on the migration of the Curlews (*Numenius a. arquata* and *N. p. phæopus*) near Danzig.

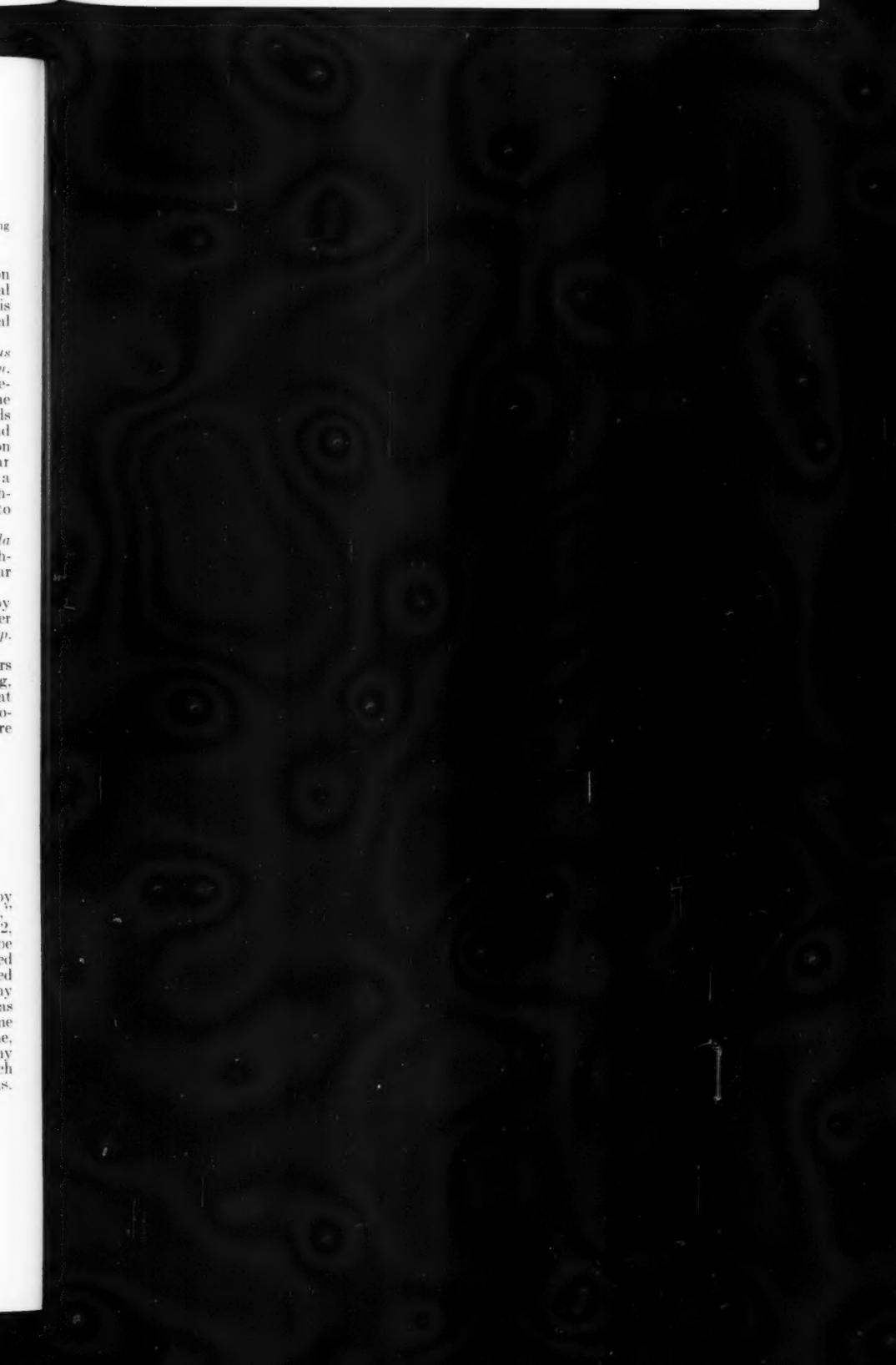
Among the short notes are observations on Crossbills and Nutcrackers in the Ukraine, on Crossbills, Woodpeckers, and Nutcrackers near Danzig, and invasion of the Large Spotted Woodpecker (*Dryobates m. major*) at Helgoland, and a February record of a European Woodcock, also at Helgoland. A few short notes on banding technique and reviews of literature complete the number.—H. F.

CORRESPONDENCE

A NOTE ON A PROPOSED ADDITION TO BANDING TERMINOLOGY

Editor of Bird-Banding:

With reference to the question of proposing a common term for use by bird-banders to include all such terms as "repeat," "return," and "recovery," which was dealt with in a previous letter (*Bird-Banding*, Vol. 1, No. 2, pp. 93–94), with an expression of the hope that such a term would be proposed by Mrs. Mabel Gillespie, who had already published detailed "Suggestions for a Revised Bird-Banding Terminology," it may be stated that Mrs. Gillespie, in correspondence, has expressed preference that any such term that may be proposed should be proposed by me, as she has scarcely felt the need of it in her work. She has, however, kindly given me the benefit of her comment and opinion on the matter. As the outcome, I propose that the word "retake" be used as a substantive to indicate any individual recognition of a banded bird subsequent to its banding, if such use meets with the general approval of bird-banders.—Harrison F. Lewis. Ottawa, Canada, March 23, 1930.



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